THE REPUBLIC OF KENYA

COMPETENCY BASED CURRICULUM

FOR

BUILDING TECHNOLOGY

LEVEL 6

TVET CDACC

P.O BOX 15745-00100

NAIROBI

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FOREWORD

The provision of quality education and training is fundamental to the Government's overall strategy for social economic development. Quality education and training will contribute to achievement of Kenya's development blueprint and sustainable development goals.

Reforms in the education sector are necessary for the achievement of Kenya Vision 2030 and meeting the provisions of the Constitution of Kenya 2010. The education sector had to be aligned to the Constitution and this resulted to the formulation of the Policy Framework for Reforming Education and Training (Sectional Paper No. 4 of 2016). A key feature of this policy is the radical change in the design and delivery of the TVET training. This policy document requires that training in TVET be Competency Based, Curriculum development be industry led, certification be based on demonstration of competence and mode of delivery allows for multiple entry and exit in TVET programmes.

These reforms demand that Industry takes a leading role in Curriculum development to ensure the Curriculum addresses its competence needs. It is against this background that this Curriculum has been developed.

It is my conviction that this Curriculum will play a great role towards development of competent human resource for the Building and Construction Sector.

PRINCIPAL SECRETARY, VOCATIONAL AND TECHNICAL TRAINING

MINISTRY OF EDUCATION

PREFACE

Kenya Vision 2030 aims to transform the country into a newly industrializing, "middle-income country providing a high-quality life to all its citizens by the year 2030". Kenya intends to create a globally competitive and adaptive human resource base to meet the requirements of a rapidly industrializing economy through life-long education and training. TVET has a responsibility of facilitating the process of inculcating knowledge, skills and attitudes necessary for catapulting the nation to a globally competitive country, hence the paradigm shift to embrace Competency Based Education and Training (CBET).

The Technical and Vocational Education and Training Act No. 29 of 2013 and Sectional Paper No. 4 of 2016 on Reforming Education and Training in Kenya, emphasized the need to reform Curriculum development, assessment and certification. This called for a shift to CBET in order to address the mismatch between skills acquired through training and skills needed by industry as well as increase the global competitiveness of Kenyan labour force.

TVET Curriculum Development, Assessment and Certification Council (TVET CDACC) in conjunction with Building and Construction Sector Skills Advisory Committee (SSAC) have developed this Curriculum.

This curriculum has been developed following the CBET framework policy; the CBETA standards and guidelines provided by the TVET Authority and the Kenya National Qualification Framework designed by the Kenya National Qualification Authority.

This Curriculum is designed and organized with an outline of learning outcomes; Suggested Methods of Instruction: training/learning resources and methods of assessing the trainee's achievement. The Curriculum is competency-based and allows multiple entry and exit to the course.

 I am grateful to the Council members, Council Secretariat, Building and Construction SSAC, expert workers and all those who participated in the development of this Curriculum.

CHAIRPERSON, TVET CDACC

ACKNOWLEDGEMENT

This Curriculum has been designed for competency-based training and has independent units of learning that allow the trainee flexibility in entry and exit. In developing the Curriculum, significant involvement and support was received from various organizations.

I recognize with appreciation the role of construction and building Sector Skills Advisory Committee (SSAC) members for their contribution to the development of this Curriculum.

I also thank all stakeholders in the Building and Construction Sector for their valuable input and all those who participated in the process of developing this Curriculum.

I am convinced that this Curriculum will go a long way in ensuring that workers in building and construction acquire competencies that will enable them to perform their work more efficiently.
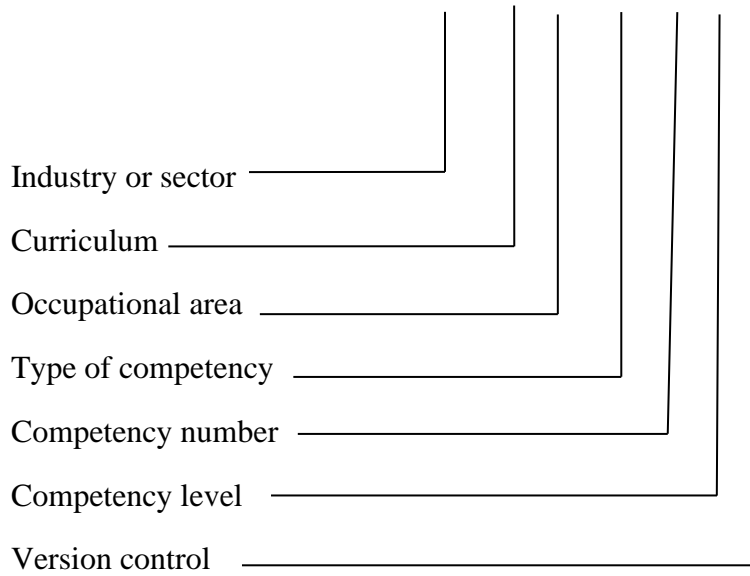
COUNCIL SECRETARY/CEO

ABBREVIATIONS AND ACRONYMS

ASTM	American society for testing and materials
BQS	Bill of Quantities
BRC	British reinforcement concrete
BS	British Standards
CAD	Computer Aided Design
CCTV	Closed-Circuit Television (surveillance)
CDACC	Curriculum Development Assessment and Certification Council
CGA	County Government Approvals
DPC	Damp proof course
DPM	Damp proof membrane
DTP	Desktop Publishing
ICT	Information Computer Technology
IEE	Institute of electrical engineers
KCSE	Kenya Certificate of Secondary Education
KEBS	Kenya Bureau of Standards
KNQA	Kenya National Qualification Authority
NOS	National Occupational Standards
PPE	Personal Protective Equipment
PPR	Polypropylene pipes
TES	Teach Elite's Shop
TVET	Technical and vocational education and training

KEY TO UNIT CODE

CON /CU/BUT/BC/01/ 6/A

Industry or sector

Curriculum

Occupational area

Type of competency

Competency number

Competency level

Version control

TABLE OF CONTENTS

1. Brief Description of The Course:

The present Curriculum presents a coherent and significant set of competences to acquire in order to perform the Occupation of a Building Technician level 6. The competency-based approach, used to design the Curriculum, is industry driven and has considered the training needs, the work situation, as well as the goals and the means to implement training units of competencies.

The units of competencies, within the present Curriculum, include a statement, description and a set of expected outcomes and results at the end of the training of each unit. It also clearly mentioned the training contents, the methods of training delivery, the methods of assessment, a list of main materials/tools/equipment needed and a list of recommended resources for each of the units.

The description of elements, methods of delivery and assessment and the lists of materials/tools and equipment will have a direct influence on the choice of the theoretical and/or practical learning activities and their respective timing. The competences are the targets of training: the acquisition of each is required for certification.

The present Curriculum consists of the following units

Basic units of learning:

Unit of Learning Code	Unit of Learning Title	Duration in Hours	CREDIT FACTOR
CON/CU/BUT/BC/01/6	Communication Skills	40	4
CON/CU/BUT/BC/02/6	Digital Literacy	60	6
CON/CU/BUT/BC/03/6	Entrepreneurial Skills	100	10
CON/CU/BUT/BC/04/6	Employability Skills	80	8
CON/CU/BUT/BC/05/6	Environmental Literacy	40	4
CON/CU/BUT/BC/06/6	Occupational Safety and Health Practices	40	4
Total Number of Hours		**360**	**36**

Common Units of Learning

Unit Code	Unit Title	Duration in Hours	Credit factor
ENG/CU/BUT/CC/01/6	Engineering Mathematics	150	15
CON/CU/BUT/CC/02/6	Technical Drawing	150	15

CON/CU/BUT/CC/03/6	Building Materials Science	75	7.5
CON/CU/BUT/CC/04/6	Workshop Technology Practices	75	7.5
CON/CU/BUT/CC/05/6	Building Temporary Works	75	7.5
Total Number of Hours		**525**	**52.5**

Core competency units:

Unit of Learning Code	Unit of Learning Title	Duration in Hrs	Credit factor
CON/CU/BUT/CR/01/6	Building Drawings	90	9
CON/CU/BUT/CR/02/6	Site Preliminary Works	80	8
CON/CU/BUT/CR/03/6	Masonry Units	100	10
CON/CU/BUT/CR/04/6	Construction Materials, Plant, Tools and Equipment	70	7
CON/CU/BUT/CR/05/6	Substructure Works	80	8
CON/CU/BUT/CR/06/6	Superstructure Works	120	12
CON/CU/BUT/CR/07/6	Building Finishes	90	9
CON/CU/BUT/CR/08/6	Building External Works	90	9
CON/CU/BUT/CR/09/6	Building Services	100	10
CON/CU/BUT/CR/10/6	Building Doors and Windows Installation	80	8
CON/CU/BUT/CR/11/6	Supervising Construction Project	90	9
	Industrial Attachment	480	48
Total Number of Hours		**990**	**147**
GRAND TOTAL		**2400**	**243**

2. Entry Requirements

An individual entering this course should have any of the following minimum requirements:

a) Kenya Certificate of Secondary Education (KCSE)C (Minus)

Or

b) Certificate in Building Technology Level 5

Or

c) Any equivalent qualifications as determined by Kenya National Qualifications Authority (KNQA)

3. **Trainer qualification**

   A trainer for this course should have a higher qualification than the level of this course

4. **Provision for Industrial attachment**

It is envisaged that the trainee will undergo an industrial attachment training and assessment with a recognised construction services provider as a prerequisite for completion of this training course.

5. **Assessment**

Assessment is the process of gathering and judging evidence in order to decide whether a person has attained a standard of performance. The course will be assessed at two levels:

- Internal assessment is continuous and is conducted by the trainer who is monitored by an internal accredited verifier

- External assessment is the responsibility of TVET CDACC

6. **Certification**

On successful completion of a unit of learning, a trainee will be issued with a Certificate of Competency for that unit and on successful completion of all units of learning a trainee will be awarded with a National Certified Building Technology Qualification. These certificates will be issued by TVET CDACC in conjunction with training provider.

BASIC UNITS OF LEARNING

COMMUNICATION SKILLS

UNIT CODE: CON/CU/BUT/BC/01/6/A

Relationship to Occupational Standards

This unit addresses the Unit of Competency: Demonstrate Communication Skills

Duration of Unit: 40 hours

Unit Description

This unit covers the competencies required to demonstrate communication skills .It involves, meeting communication needs of clients and colleagues; developing communication strategies, establishing and maintaining communication pathways, conducting interviews, facilitating group discussion and representing the organization.

Summary of Learning Outcomes
1. Meet communication needs of clients and colleagues
2. Develop communication strategies
3. Establish and maintain communication pathways
4. Promote use of communication strategies
5. Conduct interview
6. Facilitate group discussion
7. Represent the organization

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Meet communication needs of clients and colleagues	• Communication process • Modes of communication • Medium of communication • Effective communication • Barriers to communication • Flow of communication • Sources of information • Organizational policies	• Interview • Written Tests

		Organization requirements for Written Tests and electronic communication methods	
		Report writing	
		Effective questioning techniques (clarifying and probing)	
		Workplace etiquette	
		Ethical work practices in handling communication	
		Active listening	
		Feedback	
		Interpretation	
		Flexibility in communication	
		Types of communication strategies	
		Elements of communication strategy	
2. Develop communication strategies	• Dynamics of groups • Styles of group leadership • Openness and flexibility in communication • Communication skills relevant to client groups		• Interview • Written Tests
3. Establish and maintain communication pathways	• Types of communication pathways		• Interview • Written Tests
4. Promote use of communication strategies	• Application of elements of communication strategies • Effective communication techniques		• Interview • Written Tests
5. Conduct interview	• Types of interview • Establishing rapport • Facilitating resolution of issues • Developing action plans		• Interview • Written Tests
6. Facilitate group discussion	• Identification of communication needs		• Interview • Written Tests

	• Dynamics of groups • Styles of group leadership • Presentation of information • Encouraging group members participation • Evaluating group communication strategies	
7. Represent the organization	• Presentation techniques • Development of a presentation • Multi-media utilization in presentation • Communication skills relevant to client groups	• Interview • Written Tests

Suggested Methods of Instruction
- Discussion
- Role playing
- Simulation
- Direct instruction

Recommended Resources
- Desktop computers/laptops
- Internet connection
- Projectors
- Telephone

DIGITAL LITERACY

UNIT CODE:CON/CU/BUT/BC/02/6/A

Relationship to Occupational Standards

This unit addresses the Unit of Competency: Demonstrate Digital Literacy

Duration of Unit: 60 hours

Unit Description

This unit describes competencies required to demonstrate digital literacy. It involves in identifying computer software and hardware, applying security measures to data, hardware, software in automated environment, computer software in solving task, internet and email in communication at workplace, desktop publishing in official assignments and preparing presentation packages.

Summary of Learning Outcomes
1. Identify computer software and hardware
2. Apply security measures to data, hardware, software in automated environment
3. Apply computer software in solving tasks
4. Apply internet and email in communication at workplace
5. Apply desktop publishing in official assignments
6. Prepare presentation packages

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Identify computer hardware and software	• Concepts of ICT • Functions of ICT • History of computers • Components of a computer • Classification of computers	• Written Tests • Oral Questioning presentation
2. Apply security measures to data,	• Data security and control	• Written Tests

hardware, software in automated environment	• Security threats and control measures • Types of computer crimes • Detection and protection against computer crimes • Laws governing protection of ICT	• Oral Questioning presentation • Project
3. Apply computer software in solving tasks	• Operating system • Word processing • Spread sheets • Data base design and manipulation • Data manipulation, storage and retrieval	• Oral Questioning • Project
4. Apply internet and email in communication at workplace	• Computer networks • Network configurations • Uses of internet • Electronic mail (e-mail) concept	• Oral Questioning • Written Tests report
5. Apply desktop publishing in official assignments	• Concept of desktop publishing • Opening publication window • Identifying different tools and tool bars • Determining page layout • Opening, saving and closing files • Drawing various shapes using DTP • Using colour pellets to enhance a document • Inserting frames • Importing and exporting • Object linking and embedding • Designing of various publications	• Oral Questioning • Written Tests report • Project

	• Printing of various publications	
6. Prepare presentation packages	• Types of presentation packages • Procedure of creating slides • Formatting slides • Presentation of slides • Procedure for editing objects	• Oral Questioning • Written Tests report • Project

Suggested Methods of Instruction
- Instructor led facilitation of theory
- Demonstration by trainer
- Practical work by trainee
- Viewing of related videos
- Project
- Group discussions

Recommended Resources
- Computers
- Printers
- Storage devices
- Internet access

ENTREPRENEURIAL SKILLS

UNIT CODE: CON/CU/BUT/BC/03/6/A

Relationship to Occupational Standards

This unit addresses the Unit of Competency: Demonstrate Entrepreneurial Skills

Duration of unit: 100 hours

Unit Description

This unit covers the competencies required to demonstrate understanding of entrepreneurship. It involves demonstrating understanding of an entrepreneur, entrepreneurship and self-employment. It also involves identifying entrepreneurship opportunities, creating entrepreneurial awareness, applying entrepreneurial motivation and developing business innovative strategies.

Summary of Learning Outcomes

1. Demonstrate understanding of who an entrepreneur
2. Demonstrate knowledge of entrepreneurship and self-employment
3. Identify entrepreneurship opportunities
4. Create entrepreneurial awareness
5. Apply entrepreneurial motivation
6. Develop business innovative strategies
7. Develop Business plan

Learning Outcome	Content	Suggested Assessment Methods

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1. Demonstrate knowledge of entrepreneurship and self-employment\	• Importance of self-employment • Requirements for entry into self-employment • Role of an Entrepreneur in business • Contributions of Entrepreneurs to National development • Entrepreneurship culture in Kenya • Born or made entrepreneurs	• Individual/group assignments • Projects • Written Tests • Oral Questioning questions • Third party report
2. Identify entrepreneurship opportunities	• Business ideas and opportunities • Sources of business ideas • Business life cycle • Legal aspects of business • Assessment of product demand • Business environment • Factors to consider when evaluating business environment • Technology in business	• Individual/group assignments • Projects • Written Tests • Oral Questioning questions • Third party report • Interviews
3. Create entrepreneurial awareness	• Forms of businesses • Sources of business finance • Factors in selecting source of business finance • Governing policies on Small Scale Enterprises (SSEs) • Problems of starting and operating SSEs	• Individual/group assignments • Projects • Written Tests • Oral Questioning questions • Third party report • Interviews

4. Apply entrepreneurial motivation	• Internal and external motivation • Motivational theories • Self-assessment • Entrepreneurial orientation • Effective communications in entrepreneurship • Principles of communication • Entrepreneurial motivation	• Case studies • Individual/group assignments • Projects • Written Tests • Oral Questioning questions • Third party report • Interviews
5. Develop business innovative strategies	• Innovation in business • Small business Strategic Plan • Creativity in business development • Linkages with other entrepreneurs • ICT in business growth and development	• Case studies • Individual/group assignments • Projects • Written Tests • Oral Questioning questions • Third party report • Interviews
1. Develop Business Plan	• Business description • Marketing plan • Organizational/Management • plan • Production/operation plan • Financial plan • Executive summary • Presentation of Business Plan	• Case studies • Individual/group assignments • Projects • Written Tests • Oral Questioning questions • Third party report • Interviews

Suggested Methods of Instruction
- Direct instruction
- Project
- Case studies
- Field trips
- Discussions
- Demonstration
- Question and answer
- Problem solving

- Experiential
- Team training

Recommended Resources

- Case studies
- Business plan templates
- Computers
- Overhead projectors
- Internet
- Mobile phone
- Video clips
- Films
- Newspapers and Handouts
- Business Journals
- Writing materials

EMPLOYABILITY SKILLS

UNIT CODE: CON/CU/BUT/BC/04/6/A

Relationship to Occupational Standards

This unit addresses the Unit of Competency: Demonstrate Employability Skills

Duration of Unit: 80 hours

Unit Description

This unit covers competencies required to demonstrate employability skills. It involves conducting self-management, demonstrating interpersonal communication, critical safe work habits, leading a workplace team, planning and organizing work, maintaining professional growth and development, demonstrating workplace learning, problem solving skills and managing ethical performance.

Summary of Learning Outcomes

1. Conduct self-management
2. Demonstrate interpersonal communication
3. Demonstrate critical safe work habits
4. Lead a workplace team
5. Plan and organize work
6. Maintain professional growth and development
7. Demonstrate workplace learning
8. Demonstrate problem solving skills
9. Manage ethical performance

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Conduct self-management	• Self-awareness • Formulating personal vision, mission and goals • Strategies for overcoming life challenges	• Written Tests • Oral Questioning • Interviewing

	• Managing emotions • Emotional intelligence • Assertiveness versus aggressiveness • Expressing personal thoughts, feelings and beliefs • Developing and maintaining high self-esteem • Developing and maintaining positive self-image • Setting performance targets • Monitoring and evaluating performance • Articulating ideas and aspirations • Accountability and responsibility • Good work habits • Self-awareness • Values and beliefs • Self-development • Financial literacy • Healthy lifestyle practices • Adopting safety practices	• Portfolio of evidence • Third party report
2. Demonstrate interpersonal communication	• Meaning of interpersonal communication • Listening skills • Types of audience • Public speaking • Writing skills • Negotiation skills • Reading skills • Meaning of empathy • Understanding customers' needs • Establishing communication networks • Assertiveness	• Written Tests • Oral Questioning • Interviewing • Portfolio of evidence • Third party report

	• Sharing information	
3. Demonstrate critical safe work habits	• Stress and stress management • Time concept • Punctuality and time consciousness • Leisure • Integrating personal objectives into organizational objectives • Resources mobilization • Resources utilization • Setting work priorities • Developing healthy relationships • HIV and AIDS • Drug and substance abuse • Managing emerging issues	• Written Tests • Oral Questioning • Interviewing • Portfolio of evidence • Third party report
4. Lead a workplace team	• Leadership qualities • Power and authority • Team building • Determination of team roles and objectives • Team parameters and relationships • Individual responsibilities in a team • Forms of communication • Complementing team activities • Gender and gender mainstreaming • Human rights • Developing healthy relationships • Maintaining relationships	• Written Tests • Oral Questioning • Interviewing • Portfolio of evidence • Third party report

	• Conflicts and conflict resolution • Coaching and mentoring skills	
5. Plan and organize work	• Functions of management • Planning • Organizing • Time management • Decision making concept • Task allocation • Developing work plans • Developing work goals/objectives and deliverables • Monitoring work activities • Evaluating work activities • Resource mobilization • Resource allocation • Resource utilization • Proactive planning • Risk evaluation • Problem solving • Collecting, analysing and organising information • Negotiation	• Written Tests • Oral Questioning • Interviewing • Portfolio of evidence • Third party report
6. Maintain professional growth and development	• Avenues for professional growth • Training and career opportunities • Assessing training needs • Mobilizing training resources • Licenses and certifications for professional growth and development • Pursuing personal and organizational goals • Managing work priorities and commitments	• Written Tests • Oral Questioning • Interviewing • Portfolio of evidence • Third party report

	• Recognizing career advancement	
7. Demonstrate workplace learning	• Managing own learning • Mentoring • Coaching • Contributing to the learning community at the workplace • Cultural aspects of work • Networking • Variety of learning con • Application of learning • Safe use of technology • Taking initiative/proactivity • Flexibility • Identifying opportunities • Generating new ideas • Workplace innovation • Performance improvement • Managing emerging issues • Future trends and concerns in learning	• Written Tests • Oral Questioning • Interviewing • Portfolio of evidence • Third party report
8. Demonstrate problem solving skills	• Critical thinking process • Data analysis tools • Decision making • Creative thinking • Development of creative, innovative and practical solutions • Independence in identifying and solving problems • Solving problems in teams • Application of problem-solving strategies • Testing assumptions • Resolving customer concerns	• Written Tests • Oral Questioning • Interviewing • Portfolio of evidence • Third party report
9. Manage ethical performance	• Meaning of ethics • Ethical perspectives	• Written Tests

	• Principles of ethics • Ethical standards • Organization code of ethics • Common ethical dilemmas • Organization culture • Corruption, bribery and conflict of interest • Privacy and data protection • Diversity, harassment and mutual respect • Financial responsibility/accountability • Etiquette • Personal and professional integrity • Commitment to jurisdictional laws • Emerging issues in ethics	• Oral Questioning • Interviewing • Portfolio of evidence • Third party report

Suggested Methods of Instruction

- Demonstrations
- Simulation/Role play
- Group Discussion
- Presentations
- Assignments
- Q&A

Recommended Resources

- Computers
- Stationery
- Charts
- Video clips
- Audio tapes
- Radio sets
- TV sets
- LCD projectors

ENVIRONMENTAL LITERACY

UNIT CODE: CON/CU/BUT/BC/05/6/A

Relationship to Occupational Standards:

This unit addresses the Unit of Competency : Demonstrate Environmental Literacy

Duration of Unit: 40 hours

Unit Description

This unit describes the competencies required demonstrate environmental literacy.it involves controlling environmental hazard, controlling environmental pollution, complying with workplace sustainable resource use, evaluating current practices in relation to resource usage, identifying environmental legislations/conventions for environmental concerns, implementing specific environmental programs, monitoring activities on environmental protection/programs, analysing resource use and developing resource conservation plans.

Summary of Learning Outcomes
1. Control environmental hazard
2. Control environmental Pollution
3. Demonstrate sustainable resource use
4. Evaluate current practices in relation to resource usage
5. Identify Environmental legislations/conventions for environmental concerns
6. Implement specific environmental programs
7. Monitor activities on Environmental protection/Programs
8. Analyze resource use
9. Develop resource conservation plans

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods

1. Control environmental hazard	• Purposes and content of Environmental Management and Coordination Act 1999 • Storage methods for environmentally hazardous materials • Disposal methods of hazardous wastes • Types and uses of PPE in line with environmental regulations • Occupational Safety and Health Standards (OSHS)	• Written Tests questions • Oral Questioning questions
2. Control environmental Pollution control	• Types of pollution • Environmental pollution control measures • Types of solid wastes • Procedures for solid waste management • Different types of noise pollution • Methods for minimizing noise pollution	• Written Tests questions • Oral Questioning questions • Role play
3. Demonstrate sustainable resource use	• Types of resources • Techniques in measuring current usage of resources • Calculating current usage of resources • Methods for minimizing wastage • Waste management procedures • Principles of 3Rs (Reduce, Reuse, Recycle) • Methods for economizing or reducing resource consumption	• Written Tests questions • Oral Questioning questions • Role play

4. Evaluate current practices in relation to resource usage	• Collection of information on environmental and resource efficiency systems and procedures, • Measurement and recording of current resource usage • Analysis and recording of current purchasing strategies. • Analysis of current work processes to access information and data • Identification of areas for improvement	• Written Tests questions • Oral Questioning questions • Role play
5. Identify Environmental legislations/conventions for environmental concerns	• Environmental issues/concerns • Environmental legislations /conventions and local ordinances • Industrial standard /environmental practices • International Environmental Protocols (Montreal, Kyoto) • Features of an environmental strategy	• Written Tests questions • Oral Questioning questions
6. Implement specific environmental programs	• Community needs and expectations • Resource availability • 5s of good housekeeping • Identification of programs/Activities • Setting of individual roles /responsibilities • Resolving problems /constraints encountered • Consultation with stakeholders	• Written Tests questions • Oral Questioning questions • Role play
7. Monitor activities on Environmental protection/Programs	• Periodic monitoring and Evaluation of activities	• Oral Questioning questions

	• Gathering feedback from stakeholders • Analyzing data gathered • Documentation of recommendations and submission • Setting of management support systems to sustain and enhance the program • Monitoring and reporting of environmental incidents to concerned /proper authorities	• Written Tests • Practical test
8. Analyze resource use	• Identification of resource consuming processes • Determination of quantity and nature of resource consumed • Analysis of resource flow through different parts of the process. • Classification of wastes for possible source of resources.	• Written Tests • Oral Questioning questions • Practical test
9. Develop resource Conservation plans	• Determination of efficiency of use/conversion of resources • Causes of low efficiency of use of resources • Plans for increasing the efficiency of resource use	• Written Tests • Oral Questioning questions • Practical test

Suggested Methods of Instruction
- Instructor led facilitation of theory
- Practical demonstration of tasks by trainer
- Practice by trainees
- Observations and comments and corrections by trainers

Recommended Resources

- Standard operating and/or other workplace procedures manuals
- Specific job procedures manuals
- Environmental Management and Coordination Act 1999
- Machine/equipment manufacturer's specifications and instructions
- Personal Protective Equipment (PPE)
- ISO standards
- Company environmental management systems (EMS)
- Montreal Protocol
- Kyoto Protocol

OCCUPATIONAL SAFETY AND HEALTH PRACTICES

UNIT CODE: …/CU/…/BC/06/6/A

Relationship to Occupational Standards

This unit addresses the unit of competency: Demonstrate Occupational Safety and Health Practices

Duration of Unit: 40 hours

Unit Description

This unit specifies the competencies required to demonstrate occupational health and safety practices. It involves identifying workplace hazards and risk, identifying and implementing appropriate control measures to hazards and risks and implementing OSH programs, procedures and policies/guidelines.

Summary of Learning Outcomes
1. Identify workplace hazards and risk
2. Control OSH hazards
3. Implement OSH programs

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Identify workplace hazards and risks	• Identification of hazards in the workplace and/or the indicators of their presence • Evaluation and/or work environment measurements of OSH hazards/risk existing in the workplace • Gathering of OSH issues and/or concerns	• Oral Questioning questions • Written Tests • Portfolio of evidence • Third party report
2. Control OSH hazards	• Prevention and control measures e.g. use of PPE • Risk assessment • Contingency measures	• Oral Questioning questions • Written Tests • Portfolio of evidence • Third party report
3. Implement OSH programs	• Company OSH program, evaluation and review • Implementation of OSH programs • Training of team members and advice on OSH standards and procedures • Implementation of procedures for maintaining OSH-related records	• Oral Questioning questions • Written Tests • Portfolio of evidence • Third party report

Suggested Methods of instruction
- Assigments
- Discussion
- Q&A
- Role play
- Viewing of related videos

Recommended Resources

- Standard operating and/or other workplace procedures manuals
- Specific job procedures manuals
- Machine/equipment manufacturer's specifications and instructions
- Personal Protective Equipment (PPE) e.g.
    - Mask
    - Face mask/shield
    - Safety boots
    - Safety harness
    - Arm/Hand guard, gloves
    - Eye protection (goggles, shield)
    - Hearing protection (ear muffs, ear plugs)
    - Hair Net/cap/bonnet
    - Hard hat
    - Face protection (mask, shield)
    - Apron/Gown/coverall/jump suit
    - Anti-static suits
    - High-visibility reflective vest

COMMON UNITS OF LEARNING

ENGINEERING MATHEMATICS

UNIT CODE: CON/CU/BUT/CC/01/6/A

Relationship to Occupational Standards

This unit addresses the unit of competency: Apply engineering mathematics

Duration of Unit: 150 hours

Unit Description

This unit describes the competencies required by a technician in order to apply algebra apply trigonometry and hyperbolic functions, apply complex numbers, apply coordinate geometry, carry out binomial expansion, apply calculus, solve ordinary differential equations, carry out mensuration, apply power series, apply statistics, apply numerical methods, apply vector theory and apply matrix.

Summary of Learning Outcomes

1. Apply Algebra
2. Apply Trigonometry and hyperbolic functions
3. Apply complex numbers
4. Apply Coordinate Geometry
5. Carry out Binomial Expansion
6. Apply Calculus
7. Solve Ordinary differential equations
8. Carry out Mensuration
9. Apply Power Series
10. Apply Statistics
11. Apply Numerical methods
12. Apply Vector theory
13. Apply Matrix

Learning Outcomes, Content and Suggested Assessment Methods

Building Technology Curriculum		
Learning Outcome	**Content**	**Suggested Assessment Methods**
1. Apply Algebra	- Base and Index - Law of indices - Indicial equations - Laws of logarithm - Logarithmic equations - Conversion of bases - Use of calculator - Reduction of equations - Solution of equations reduced to quadratic form - Solutions of simultaneous linear equations in three unknowns - Solutions of problems involving AP and GP	- Written Tests - Oral Questioning - Assignments - Supervised exercises

2. Apply Trigonometry and hyperbolic functions	• Half -angle formula • Factor formula • Trigonometric functions • Parametric equations • Relative and absolute measures • Measures calculation • Definition of hyperbolic equations • Properties of hyperbolic functions • Evaluations of hyperbolic functions Hyperbolic identities • Osborne's Rule • Ashx+bshx=C equation • One-to-one relationship in functions • Inverse functions for one-to-one relationship • Inverse functions for trigonometric functions • Graph of inverse functions • Inverse hyperbolic functions	• Written Tests • Oral Questioning • Assignments • Supervised exercises
3. Apply complex numbers	• Definition of complex numbers • Stating complex numbers in numbers in terms of conjugate argument and • Modulus • Representation of complex numbers on the Argand diagram • Arithmetic operation of complex numbers Application of De Moivre's theorem	• Assignments • Oral Questioning • Supervised exercises • Written Tests

	• Application of complex numbers to engineering	
4. Apply Coordinate Geometry	• Polar equations • Cartesian equation • Graphs of polar equations • Normal and tangents • Definition of a point • Locus of a point in relation to a circle • Loci of points for given mechanism	• Written Tests • Oral Questioning • Assignments • Supervised exercises
5. Carry out Binomial Expansion	• Binomial theorem Power series using binomial theorem Roots of numbers using binomial theorem. • Estimation of errors of small changes using binomial theorem.	• Written Tests • Oral Questioning • Assignments • Supervised exercises

6. Apply Calculus	• Definition of derivatives of a function	• Written Tests
	• Differentiation from fist principle	• Oral Questioning
	• Tables of some common derivatives	• Assignments
	• Rules of differentiation	• Supervised exercises
	• Rate of change and small change	
	• Stationery points of functions of two variables	
	• Definition of integration	
	• Indefinite and definite integral	
	• Methods of integration application of integration.	
	• Integrals of hyperbolic and inverse functions	
7. Solve Ordinary differential equations	• Types of first order differential equations	• Written Tests
	• Formation of first order differential equation	• Oral Questioning
	• Solution of first order differential equations	• Assignments
	• Application of first order differential equations	• Supervised exercises
	• Formation of second order differential equations for various systems	

	• Solution of second order differential equations • Application of second order differential equations	
8. Carry out Mensuration	• Units of measurements • Perimeter and areas of regular figures • Volume of regular solids • Surface area of regular solids • Area of irregular figures • Areas and volumes using Pappus theorem	• Written Tests • Oral Questioning • Assignments • Supervised exercises
9. Apply Power Series	• Definition of the term power series • Taylor's theorem • Deduction of McLaurin's theorem to obtain power series • Application of Taylor's theorem and McLaurin's theorems in numerical work	• Written Tests • Oral Questioning • Assignments • Supervised exercises
10. Apply Statistics	• Measures of central tendency mean, mode and median • Measures of dispersion o Variance and standard deviation • Definition of probability	• Assignments • Oral Questioning • Supervised exercises • Written Tests • Simulation

	• Laws of probability	• Data modelling
	• Expectation variance and S.D.	
	• Types of distributions	
	• Mean, variance and SD of probability distributions	
	• Application of probability distributions	
11. Apply Numerical methods	• Definition of interpolation and extrapolation	• Assignments
	• Application of interpolation	• Oral Questioning
	• Application of interactive methods to solve equations	• Supervised exercises
	• Application of interactive methods to areas and volumes	• Written Tests
12. Apply Vector theory	• Vectors and scalar in two and three dimensions	• Assignments
	• Operations on vectors: Addition and Subtraction	• Oral Questioning
	• Position vectors	• Supervised exercises
	• Resolution of vectors	• Written Tests
13. Apply Matrix methods	• Matrix operation	• Assignments
	• Determinant of 3x3 matrix	• Oral Questioning

©TVET CDACC 2018	• Inverse of 3x3 matrix • Solution of linear simultaneous equations in 3 unknown • Application of matrices	• Supervised exercises • Written Tests	33

Suggested Methods of Instruction:
- Group discussions
- Demonstration by trainer
- Exercises by trainee

Recommended Resources
- Scientific Calculators
- Rulers, pencils, erasers
- Charts with presentations of data
- Graph books
- Dice
- Computers with internet connection

TECHNICAL DRAWING

UNIT CODE: CON/CU/BUT/CC/02/6

Relationship to Occupational Standards

This unit addresses the unit of competency: Prepare and interpret technical drawings

Duration of Unit: 150 hours

Unit Description

This unit covers the competencies required to prepare and interpret technical drawings. It involves competencies to select, use and maintain drawing equipment and materials. It also involves producing plain geometry drawings, solid geometry drawings, pictorial and orthographic drawings of components and application of Computer Aided Design (CAD) packages.

Summary of Learning Outcomes

1. Use and maintain drawing equipment and materials
2. Produce plane geometry drawings
3. Produce solid geometry drawings
4. Produce Orthographic and Pictorial Drawings
5. Apply CAD packages

Learning Outcomes, Content and Suggested Assessment Methods:

Learning Outcome	Content	Suggested Assessment Methods
1. Use and maintain drawing equipment and materials	• Identification and care of drawing equipment • Identification and care of drawing materials • Reference to manufacturer's instructions and work place procedures on use and maintenance of drawing equipment and materials • Reference to relevant environmental legislations • Use of Personal Protective Equipment (PPEs)	• Observation • Oral Questioning • Written Tests

2. Produce plane geometry drawings	• Types of lines in drawings • Construction of geometric forms e.g. squares, circles • Construction of different angles • Measurement of different angles • Bisection of different angles and lines • Standard drawing conventions	• Oral Questioning • Practical tests • Observation
3. Produce solid geometry drawings	• Interpretation of sketches and drawings of patterns e.g. cylinders, prisms and pyramids • Sectioning of solids e.g. prisms, cones • Development and interpenetrations of solids e.g. cylinder to cylinder and cylinder to triangular, prism	• Observation • Practical tests • Oral Questioning
4. Produce orthographic and Pictorial drawings	• Meaning of pictorial and orthographic drawings • Meaning of sectioning • Meaning of symbols and abbreviations • Drawing and interpretation of orthographic elevations • Dimensioning of orthographic elevations • Sectioning of views • Meaning of pictorial drawings • Drawing objects in isometric view • Drawing objects in oblique view	• Observation • Practical tests • Oral Questioning

5. Apply CAD packages	• Identification of CAD packages e.g. AutoCAD, circuit maker
	• Use of CAD packages in drawing of:
	   • Plane geometry
	   • Solid
	   • Orthographic
	   • Pictorial
		• Observation
		• Oral Questioning
		• Practical tests

Suggested Methods of Delivery
- Projects
- Demonstration by trainer
- Practice by the trainee
- Discussions

Recommended Resources
- Drawing room
- Drawing instruments e.g. T-squares, set squares, drawing sets
- Drawing tables
- Pencils, papers, erasers
- Masking tapes
- Computers installed with relevant CAD packages

BUILDING MATERIALS SCIENCE

UNIT CODE: CON/CU/BUT/CC/03/6/A

Relationship to Occupational Standards

This unit addresses the unit of competency: Apply Building Materials Science

Duration of Unit: 75 Hours

Unit Description

This unit describes the competence in applying building materials science. It involves identifying essential construction materials, identifying properties of construction materials, manufacturing construction materials, selecting quality construction materials, using construction materials appropriately, testing construction materials and demonstrating knowledge in use of construction materials.

Summary of Learning Outcomes

1. Identify essential construction materials
2. Identify properties of construction materials
3. Manufacture construction materials
4. Select quality construction materials
5. Use construction materials appropriately
6. Test construction materials
7. Handle construction materials safely

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Identify essential construction materials	• Engineering drawings interpretation • Bills of quantities • Construction materials	• Written Tests • Oral Questioning • Practical tests/Project
2. Identify properties of construction materials	• Physical properties of construction materials • Chemical properties of construction materials • Mechanical properties of construction materials	• Written Tests • Oral Questioning • Practical tests/Project

3. Manufacture construction materials	• Raw materials used in manufacturing construction materials • Procedures of manufacturing construction materials • Plant and equipment used in manufacturing construction materials	• Written Tests • Oral Questioning • Practical tests/Project
4. Select quality construction materials	• Properties of quality construction materials • Construction materials Cost and quality relationship • Selection of Construction materials	• Written Tests • Oral Questioning • Practical tests/Project
5. Use construction materials appropriately	• Construction methods and processes • Appropriate use of construction materials	• Written Tests • Oral Questioning • Practical tests/Project

6. Test construction materials	• Materials testing parameters
	   • Destructive tests
	   • Non-destructive tests
	• Materials testing procedures
	• Quality assurance and control
		• Written Tests
		• Oral Questioning
		• Practical tests/Project

7. Handle construction materials safely	• User safety in handling construction materials • Construction Materials handling and storage	• Written Tests • Oral Questioning • Practical tests/Project

Suggested Methods of Instruction:
- Demonstration by trainer
- Practical work by trainee
- Demonstration videos
- Projects
- Field trips
- Trainee group discussions

Recommended Resources

Tools and equipment

- Computer

- Laboratory testing equipment
- Laboratory apparatus
- Hand tools
- Machine tools

Materials and supplies

- Computer software
- Construction materials
- Computers
- Stationery
- Manufacturer's catalogues

Personal protective equipment (PPEs)
- Safety boots
- Goggles
- Gas masks
- Helmets
- Gloves
- Dust coats
- First aid kit
- Ear muffs
- Dust masks
- Overalls

WORKSHOP TECHNOLOGY PRACTICES

UNIT CODE: CON/CU/BUT/CC/04/6/A

Relationship to Occupational Standards

This unit addresses the unit of competency: Apply Workshop Technology Practices

Duration of Unit: 75 Hours

Unit Description

This unit describes the competence in applying workshop technology practices. It entails performing masonry, plumbing and carpentry tasks. It also involves performing electrical and mechanical operations.

Summary of Learning Outcomes

1. Perform masonry tasks
2. Perform plumbing tasks
3. Perform carpentry tasks
4. Perform electrical operations
5. Perform mechanical operations

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Perform masonry tasks	• Masonry workshop safety requirements • Masonry hand tools • Masonry machine tools • Maintenance of masonry tools • Use of masonry tools	• Written Tests • Oral Questioning • Practical tests/Project
2. Perform plumbing tasks	• Plumbing workshop safety requirements • Plumbing hand tools • Plumbing machine tools • Maintenance of Plumbing tools • Use of Plumbing tools	• Written Tests • Oral Questioning • Practical tests/Project
3. Perform carpentry tasks	• Carpentry workshop safety requirements • Carpentry hand tools	• Written Tests • Oral Questioning

	Carpentry machine tools • Maintenance of Carpentry tools • Use of Carpentry tools	• Practical tests/Project
4. Perform electrical operations	• Electrical workshop safety requirements • Measurement of electrical quantities • IEE regulations • Electrical conventional tools • Installation of basic electrical circuits • Renewable energy • Power supply	• Written Tests • Oral Questioning • Practical tests/Project
5. Perform mechanical operations	• Mechanical workshop safety requirements • Mechanical hand tools • Use of mechanical tools • Diesel and petrol engines • Water pumps • Maintenance of engines and water pumps	• Written Tests • Oral Questioning • Practical tests/Project

Suggested Methods of Instruction:
- Demonstration by trainer
- Practical work by trainee
- Demonstration videos
- Field trips
- Trainee group discussions

Recommended Resources

Tools and equipment
- Masons trowel
- Wood float
- Cold chisels
- Masons square
- Spade
- Shovel
- Plumb bob

- Concrete mixer
- Block cutter
- Vibrator
- Pneumatic hammer
- Compactors
- Bench shears
- Anvil
- Pipe wrench
- Pliers
- Bending machine
- Welding
- Sheet metal holding machine
- Portable power drill
- Saws
- Planes
- Hammer
- Carpenter square
- Marking gauges
- Hand drill
- Screw drivers
- circular saw
- Thicknesser
- Portable sander
- Close cut saw
- Portable drill machine
- phase tester
- screw driver
- pliers
- long nose
- side cutter
- draw in wire
- electrical knife
- electrical hammer
- Arc welding shields
- Leather gloves
- Chipping hammers
- Welding goggles
- Tongs

- Hand vices
- Mole punch
- Pliers
- Centrifugal
- Submersible
- Reciprocating pump
- Hand pumps
- Hand grinder

Materials and supplies

- Lumber
- PPR pipes
- PVC pipes
- GI pipes
- Pipe fittings
- Cement
- Sand
- Lime
- Sheet metal
- Steel plates
- Electrical materials
- Electrical appliances
- Plumbing appliances
- Fuel
- Grease
- Oil
- Filters

Personal protective equipment (PPEs)

- Helmets
- Gloves
- Safety goggles
- Safety boots
- Overalls
- Dust masks
- Gas masks
- Dust coats

BUILDING TEMPORARY WORKS

UNIT CODE: CON/CU/BUT/CC/05/6/A

Relationship to Occupational Standards

This unit addresses the unit of competency: Execute building temporary works

Duration of Unit: 75 HOURS

Unit Description

This Unit describes the competencies required to perform building temporary works. It involves Construct and dismantle trench timbering, constructing and dismantling building formwork/shuttering and trench timbering.

Summary of Learning Outcomes
1.   Construct and dismantle building formwork/shuttering
2.   Construct and dismantle trench timbering
3.   Erect and dismantle building scaffolding
4.   Erect and dismantle building shores

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Construct and dismantle trench timbering	• Trench timbering materials and tools • Soil mechanics • Site investigation • Trench timbering methods • Trench layout design • Trench timbering dismantling	• Project/practical assignment • Written Tests • Oral Questioning
2. Construct and dismantle building formwork/shuttering	• Structural elements • Types of formwork • Formwork materials • Formwork measurements and dimensions • Timber properties • Formwork construction/installation • Formwork dismantling	• Project/practical assignment • Written Tests • Oral Questioning

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3. Erect and dismantle building scaffolding	• Types of scaffolds • Scaffold drawing • Assembling and dismantling of scaffolds • Personal protective equipment • Site safety requirements • Site clearance	• Project/practical assignment • Written Tests • Oral Questioning
4. Erect and dismantle building shores	• Types of foundations • Types of shores • Shoring materials • Shores connection methods • Construction laws • Local authority guidelines • Shoring construction and erection • Shoring dismantling	• Project/practical assignment • Written Tests • Oral Questioning

Suggested Methods of Instruction:
- Demonstration by trainer
- Practical work by trainee
- Demonstration videos
- Projects
- Group discussions

Recommended Resources

Tools and equipment
- Hammer
- Handsaw
- Shoring equipment
- Survey instruments
- Spanners
- Spirit level
- Plumb bob

Materials and supplies
- Field notebook
- Nails
- Bolts and nuts
- Timber poles
- Metal poles
- Metal plates
- Moulding oil

Personal protective equipment (PPEs)
- Overall
- Helmet
- Safety boots
- Masks
- Gloves
- First aid kit
- Reflectors
- Safety goggles

CORE UNITS OF LEARNING

BUILDING DRAWINGS

UNIT CODE:CON/CU/BUT/CR/01/6/A

Relationship to Occupational Standards

This unit addresses the unit of competency: Produce building drawings

Duration of Unit: 90 hours

Unit Description

This unit describes the competence required to produce building drawings. It involves designing architectural drawings and plumbing layouts, preparing structural, electrical and mechanical drawings.

Summary of Learning Outcomes
1. Design architectural drawings
2. Prepare structural drawings
3. Prepare electrical drawings
4. Design plumbing layout
5. Prepare mechanical drawings

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Design architectural drawings	• Drawing tools and equipment • Site investigation/surveying • Construction dimensions • Project plan and design • Architectural drawings • Building codes	• Practical assignment/project • Oral Questioning • Written Tests
2. Prepare structural drawings	• Structural elements • Codes of practice • Bar bending schedule • Structural drawings	• Practical assignment/project • Oral Questioning • Written Tests
3. Prepare civil drawings	• Civil elements • Culverts • Retaining walls • Pavements • Storm water drain systems • Septic tanks	• Practical assignment/project • Oral Questioning • Written Tests

	• Codes of practice • Civil drawings	
4. Prepare electrical drawings	• Electricity and electronics • Electrical codes of practice • Architectural layout • Electrical connection layout • Electrical drawings	• Practical assignment/project • Oral Questioning • Written Tests
5. Design plumbing layout	• Pipe sizes • Pipe types • Pipe fittings • Pipe installation • Consumption requirements • Plumbing layout	• Written Tests • Oral Questioning • Projects/practical assignment
6. Prepare mechanical drawings	• Dimensions (mechanical) • Mechanical systems • Mechanical components • Sketching mechanical components • Drafting mechanical components • Mechanical component dimensions	• Oral Questioning • Projects/practical assignments • Written Tests

Suggested Methods of Instruction:
- Demonstration by trainer
- Practical work by trainee
- Demonstration videos
- Project
- Group discussions

Recommended Resources

Tools and equipment
- measuring and drawing tools
- computers/internet
- printers/plotting device

Materials and supplies
- Codes of practice
- mechanical conventions,

Personal protective equipment (PPEs)

- dust coat
- First aid kits

SITE PRELIMINARY WORKS

UNIT CODE:CON/CU/BUT/CR/02/6/A

Relationship to Occupational Standards

This unit addresses the unit of competency: Execute Site Preliminary Works

Duration of Unit: 80 hours

Unit Description

This Unit describes the competencies required to perform site preliminary works. It involves determining site boundaries, clearing building site, hoarding/screening the site, surveying the building site, preparing site layout, testing building materials, demolishing unwanted structures and preparing site preliminary report.

Summary of Learning Outcomes
1. Determine site boundary and clear building site
2. Hoard/screen the building site
3. Survey building site
4. Prepare site layout
5. Demolish unwanted structures
6. Prepare site preliminary report

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Determine site boundary and clear building site	• Site investigation/ Land surveying • Building Drawings and interpretation • Surveying tools and equipment • Building codes • Building site conditions • Plant and equipment • Building safety regulations	• Practical assignment/project • Oral Questioning • Written Tests
2. Hoard/screen the building site	• Hoarding/screening materials • Site hoarding/fencing • Hoarding tools	• Practical assignment/project • Oral Questioning • Written Tests

3. Survey building site	• Surveying tools and equipment • Survey maps • Surveying methods • Soil sampling • Building site services	• Practical assignment/project • Oral Questioning • Written Tests
4. Prepare site layout	• Site facilities, infrastructure and traffic • Building codes • Levelling • Site layout • Construction site zones • Site installation	• Written Tests • Oral Questioning • Projects/practical assignment
5. Demolish unwanted structures	• Methods of demolishing • Safety consideration during demolition • Masonry • Concrete	• Oral Questioning • Projects/practical assignments • Written Tests

Suggested Methods of Instruction:
- Demonstration by trainer
- Practical work by trainee
- Demonstration videos
- Project / research
- Group discussions

Recommended Resources

Tools and equipment
- measuring and drawing tools
- clearing plants and equipment
- computers/internet
- Masonry/building tools and equipment
- surveying tools and equipment /instrument
- Soil testing instruments/equipment

Materials and supplies

- Site survey maps
- Hoarding materials
- Demolition material
- Building Codes / regulations
- Sand
- Ballast
- Cement
- Damp proofing materials
- Anti-termite
- Reinforcement/reinforcing bar
- Dewatering equipment

Personal protective equipment (PPEs)

- dust coat
- First aid kits
- Overalls
- Gum boots
- Safety goggles
- Helmets
- Gloves

MASONRY UNITS

UNIT CODE:CON/CU/BUT/CR/03/6

Relationship to Occupational Standards

This unit addresses the unit of competency: Produce Masonry Units

Duration of Unit: 100 hours

Unit Description

This unit describes the competences required to manufacture masonry units. It involves producing masonry bricks, preparing concrete and clay products and dressing building stones

Summary of Learning Outcomes
1. Produce Masonry Bricks
2. Prepare concrete products
3. Dress building stones
4. Prepare clay products

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Produce Masonry Bricks	- Woodwork - Building regulations - Soil mechanics/testing - Construction materials - Modelling and drying of bricks - Burning of bricks	- Practical assignment/project - Oral Questioning - Written Tests
2 Prepare concrete products	- concrete mould preparation - concrete constituents - Batching methods - ASTM Standards - Curing Concrete	- Practical assignment/project - Oral Questioning - Written Tests
3 Dress building stones	- Stone dressing tools - Building stones - Stone surface finish	- Practical assignment/project - Oral Questioning - Written Tests

4.Prepare clay products	• Clay products • Test of clay products • Packaging of clay products •	• Written Tests • Oral Questioning • Projects/practical assignment

Suggested Methods of Instruction:
- Demonstration by trainer
- Practical work by trainee
- Demonstration videos
- Project
- Group discussions

Recommended Resources

Tools and equipment
- Carpentry tools
- Soil testing tools and kits
- Masonry tools

Materials and supplies
- Clay
- Concrete constituents
- Water
- Packaging materials

Personal protective equipment (PPEs)
- Overalls
- Gum boots
- First aid kits
- Safety goggles
- Helmets
- Gloves
- Dust coats

CONSTRUCTION MATERIALS, PLANT, TOOLS AND EQUIPMENT

UNIT CODE:CON/CU/BUT/CR/04/6/A

Relationship to Occupational Standards

This unit addresses the unit of competency: Manage construction materials, tools and equipment

Duration of Unit: 70 hours

Unit Description

This unit describes the competences in Managing Construction Materials, Tools and Equipment. It involves preparing site facility for storage, building material and equipment scheduling, ordering and receiving materials and equipment and preparing periodic construction material and equipment report

Summary of Learning Outcomes
1.   Prepare site facility for storage
2.   Prepare building material schedule
3.   Prepare building equipment schedule
4.   Procure building materials and equipment
5.   Issue building materials and equipment

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Prepare site facility for storage	• Building materials, tools and equipment • clearing • Levelling • Erection of the facility	• Written Tests • Oral Questioning • Practical tests/Project
2. Prepare building material schedule	• Types of building materials • Standard material schedule • Standard material rates	• Written Tests • Oral Questioning • Practical tests/Project
3. Prepare building equipment schedule	• Types of equipment • Standard equipment schedule	• Written Tests • Oral Questioning • Practical tests/Project

4. Procure building materials and equipment	• Verification of documents • Catalogues • Price lists • Ordering • Verification of materials • Receiving • Recording	• Written Tests • Oral Questioning Practical tests/Project
5. Issue building materials and equipment	• Issuing of materials • Recording of issued materials	• Written Tests • Oral Questioning • Practical tests/Project
6. Test building materials	• Construction materials • Testing methods • Concrete technology	• Written Tests • Oral Questioning • Practical tests/Project

Suggested Methods of Instruction:
  • Demonstration by trainer
  • Practical work by trainee
  • Demonstration videos
  • Projects
  • Group discussions

Recommended Resources

Tools and equipment

  • Computer
  • Lorries
  • Lifts

Materials and supplies

- Stationery
- Files

Personal protective equipment (PPEs)

- Gum boots
- Gloves
- Dust coats
- First aid kit
- Life jacket
- Ear muffs
- Dust mask

SUBSTRUCTURE WORKS

UNIT CODE: CON/CU/BUT/CR/05/6/A

Relationship to Occupational Standards

This unit addresses the unit of competency: execute substructure works

Duration of Unit: 80 hours

Unit Description

This unit describes the competences required to perform substructure work. It involves setting out the building, excavating foundation, laying building foundation, erecting foundation walls, constructing solid ground floor and finishing substructure works.

Summary of Learning Outcomes
1. Set out the building
2. Excavate foundation trench
3. Lay building foundation
4. Erect foundation walls
5. Construct solid ground floor

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1.Set out the building	- Site investigation/surveying - Building Drawings and interpretation - Construction dimensions - Setting out tools and equipment - Setting out procedure - Building codes	- Practical assignment/project - Oral Questioning - Written Tests
2. Excavate building foundation	- Building foundations - Soil analysis - Timbering - Dewatering methods - Excavation plant and equipment	- Practical assignment/project - Oral Questioning - Written Tests
	- Types of foundations - Working drawings	- Practical assignment/project - Oral Questioning

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3. Lay building foundation	• Foundation reinforcement • Architectural layout	• Written Tests
4. Erect foundation walls	• Masonry • Building codes • Working drawing • Levelling • Mortar/ concrete technology • Damp proof membrane	• Written Tests • Oral Questioning • Projects/practical assignment
5.Construct solid ground floor	• Construction materials • Termite control • Damp proof membrane • Concrete technology • Floor reinforcement	• Oral Questioning • Projects/practical assignments • Written Tests

Suggested Methods of Instruction:
- Demonstration by trainer
- Practical work by trainee
- Demonstration videos
- Project
- Group discussions

Recommended Resources

Tools and equipment
- measuring and drawing tools
- computers/internet
- Masonry/building tools and equipment
-

Materials and supplies
- Building Codes
- Sand
- Ballast
- Cement
- Damp proofing materials

- Anti-termite
- Reinforcement/reinforcing bar
- Dewatering equipment
- Blinding material
-

Personal protective equipment (PPEs)
- dust coat
- First aid kits
- Overalls
- Gum boots
- Safety goggles
- Helmets
- Gloves

SUPERSTRUCTURE WORKS

UNIT CODE:CON/CU/BUT/CR/06/6/A

Relationship to Occupational Standards

This unit addresses the unit of competency: Execute superstructure works

Duration of Unit: 120 hours

Unit Description

This Unit describes the competencies required to perform superstructure works. It involves setting out and erecting superstructure walls, constructing superstructure columns, stairs, beams and upper floors, erecting building roof, constructing fire place and installing fixtures and fittings.

Summary of Learning Outcomes
1. Set out and erect superstructure walling
2. Construct superstructure columns
3. Construct superstructure beams, stairs and upper floors
4. Erect building roof
5. Construct fireplace
6. Install fixtures and fittings

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Construct superstructure columns	• Structural elements • Codes of practice • Design dimensions • Column design • Structural design drawings • Reinforcement steel • Formwork • Concrete materials • Concrete mix design • Concrete testing methods • Concrete compaction methods	• Project/practical assignment • Written Tests • Oral Questioning
2. Set out and erect superstructure walling	• Wall dimensions • Structure openings • Building and design plans	• Project/practical assignment • Written Tests

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		• Mortar materials and mixing	• Oral Questioning
		• Mortar joints	
		• Codes of practice	
		• Wall construction	
		• Occupational safety and health standards	
		• Environment Act and by laws	
3.	Construct superstructure beams, stairs and upper floor	• Beam design • Stair design • Slab design • Formwork props • Compaction methods • Floor finishing methods	• Project/practical assignment • Written Tests • Oral Questioning
4.	Erect building roof	• Types of roofs • Roof materials • Timber properties • Steel properties • Truss design • Truss installation • Roof material installation method	• Project/practical assignment • Written Tests • Oral Questioning
5.	Construct fireplace	• Fireplace design layout • Fireplace elements • Fireplace construction • Fireplace finishing	• Project/practical assignment • Written Tests • Oral Questioning
6.	Install fixtures and fittings	• Types of fixtures • Types of fittings • Installation methods • Installation tools and equipment	• Project/practical assignment • Written Tests • Oral Questioning

Suggested Methods of Instruction:
- Demonstration by trainer
- Practical work by trainee
- Demonstration videos
- Projects
- Group discussions

Recommended Resources

Tools and equipment
- Builders square
- Builders line
- Plumb bob
- Poker vibrator
- Tape measure
- Hammer
- Nails
- Spade
- Trowel
- Concrete mixer
- Float
- Brush
- Spirit level
- Wheelbarrow

Materials and supplies
- Cement
- Water
- Sand
- Ballast
- Timber
- Damp proof materials
- Hessian cloth
- Reinforcement bars
- Steel
- Hoop iron
- BRC
- Masonry units
- Iron sheets
- Warning signs

Personal protective equipment (PPEs)
- Overall
- Helmet

- Safety boots
- Masks
- Gloves
- First aid kit
- Reflectors
- Safety goggles

BUILDING FINISHES

UNIT CODE: CON/CU/BUT/CR/07/6/A

Relationship to Occupational Standards

This unit addresses the unit of competency: Execute building finishes

Duration of Unit: 90 hours

Unit Description

This unit describes the competences required to perform building finishes. It entails plastering building walls (internal and external) applying floor finishes, painting building surfaces, applying building facings, wall mastering, lining wall surfaces, carrying out pointing and jointing, cladding building walls and performing rough cast.

Summary of Learning Outcomes
1. Apply floor finishes
2. Paint building surfaces
3. Apply building facings
4. Apply wall finishes
5. Apply ceiling finishes
6. Carry out pointing and jointing
7. Perform building rough casting

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Apply floor finishes	• Types of floor finishes • Floor finishing tools & Equipment • Background preparation. • Floor finishing	• Written Tests • Oral Questioning • Practical tests/Project
2. Paint building surfaces	• Painting materials • Painting tools & Equipment • Preparation of painting surface • Paint mixing • Application of paint • Protection of painted surfaces	• Written Tests • Oral Questioning • Practical tests/Project

3. Apply building facings	• Facing materials, tools and equipment • Preparation of facing materials • Preparation of facing background • Fixing of facings	• Written Tests • Oral Questioning • Practical tests/Project
4. Apply wall finishes	• Wall mastering materials, tools and equipment • Preparation of wall surfaces • Application of wall master • Protection of wall mastered surface • Lining materials, tools and equipment • Background preparation. • Fixing of Linings • Cladding materials, tools and equipment • Background preparation • Application of claddings • Plastering tools and equipment. • Plastering materials • Background preparation • Mixing ratios/Mortar making • Application of plaster	• Written Tests • Oral Questioning • Practical tests/Project
5. Apply ceiling finishes	• Tools, materials and equipment • Types of ceiling finishes • Application of ceiling finishes • Background preparation	• Written Tests • Oral Questioning • Practical tests/Project
6. Carry out pointing and jointing	• Pointing and jointing materials, tools and equipment • Preparation of materials • Background preparation • Pointing and jointing	• Written Tests • Oral Questioning • Practical tests/Project
7. Perform building rough casting	• Rough casting materials tools and equipment • Preparation of materials • Background preparation	• Written Tests • Oral Questioning • Practical tests/Project

| | • Application of rough cast | | 68 |

Suggested Methods of Instruction:
- Demonstration by trainer
- Practical work by trainee
- Demonstration videos
- Projects
- Group discussions

Recommended Resources

Tools and equipment
- Spade
- Wheelbarrows
- Painting brushes
- Trowel
- Spririt level
- Screw driver
- Hammer
- Plumb bob
- Wooden float
- Steel float
- Head pans

Materials and supplies
- Cement
- Water
- Bricks
- Wooden blocks
- Tiles
- Lining boards
- Lime

Personal protective equipment (PPEs)
- Gum boots
- Helmets
- Gloves

- Dust coats
- First aid kits

BUILDING EXTERNAL WORKS

UNIT CODE:CON/CU/BUT/CR/08/6/A

Relationship to Occupational Standards

This unit addresses the unit of competency: Execute building external works

Duration of Unit: 90 hours

Unit Description

This Unit describes the competency required to perform building external works. It involves laying cabro blocks and paving slabs, performing landscaping, constructing drainage systems, fences and gates.

Summary of Learning Outcomes
1. Lay external paving
2. Perform landscaping
3. Construct drainage system
4. Construct fences and gates

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Lay external paving	• Types of external paving • Survey • Design interpretation • Levelling • Bonding paving joints	• Written Tests • Oral Questioning • Practical tests
2. Perform soft landscaping	• Plan interpretation • Ground preparation • Beautification • Ground irrigation methods	• Written Tests • Oral Questioning • Practical's/Projects
3. Construct drainage system	• Building codes • Excavation • Laying drainage pipes • Drainage collection chambers	• Written Tests • Oral Questioning • Practical's/Projects
4. Construct fences and gates	• Types of fences • Gate shutter materials and preparation • Taking measurements	• Written Tests • Oral Questioning • Practical's/Projects

	• Gate dimensions • Gate shutter fixing	71

Suggested Methods of Instruction:
- Demonstration by trainer
- Practical work by trainee
- Demonstration videos
- Projects
- Group discussions
- Field trips

Recommended Resources

Tools and equipment
- Spades
- Trowels
- Hammers
- Pangas
- Jembes
- Wheelbarrows
- Wood floats
- Steel floats
- Hark saws

Materials and supplies
- Ballast
- Cement
- Sand
- Water
- Trained personnel
- Pipes

Personal protective equipment (PPEs)
- Gum boots
- head covers
- gloves
- dust coats

- first aid kits
- mouth pieces

BUILDING SERVICES

UNIT CODE: CON/CU/BUT/CR/09/6

Relationship to Occupational Standards

This unit addresses the unit of competency: Install building services

Duration of Unit: 100 hours

Unit Description

This Unit describes the competencies required to install building services. It involves installing ICT and specialised services, installing electrical services and installing mechanical services

Summary of Learning Outcomes

1. Install ICT and specialized services
2. Install electrical services
3. Install mechanical services

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Install ICT and specialised services	- Range of ICT and specialised services in building - Communication ICT requirements - CCTV/security services - Materials, tools and equipment - Automated control systems - Intelligent buildings - Drafting of ICT and specialised service drawings - Installation procedures for ICT and specialised services	- Project/practical assignment - Written Tests - Oral Questioning
2. Set up electrical system	- Drafting electrical services drawings - Electrical wiring and connections - Electrical materials - Electrical tools and equipment	- Project/practical assignment - Written Tests - Oral Questioning

	• IEE regulations	
	• Plastering	
	• Mortar mixing	
	• Conduit connections and layout	
	• Surface preparation	
3. Install mechanical services	• Drafting mechanical service drawings	• Project/practical assignment
	• Water supply systems	• Written Tests
	• Testing plumbing systems	• Oral Questioning
	• Types of mechanical systems	
	• Connection tools, equipment and materials	
	• Connection channels	
	• Pipe works	
	• Conduit layout	
	• Gas systems	
	• Gas connection methods	
	• Safety and health standards	
	• Survey instruments	
	• Survey methods	
	• Site investigation/exploration	
	• Drainage materials	
	• Collection chamber types	
	• Collection chamber construction	
	• Types of drainage systems	
	• Drainage system installation	
	• Drainage pipes	
	• Drainage system testing	
	• Waste disposal Act	
	• Plumbing materials	
	• Types of pipes	
	• Plumbing tools and equipment	
	• Pipe connection sockets	
	• Pipe bending and cutting	
	• Pipe alignment	
	• Pipe threading	
	• Plumbing layout	

Suggested Methods of Instruction:
- Demonstration by trainer
- Practical work by trainee
- Demonstration videos
- Projects
- Group discussions

Recommended Resources

Tools and equipment
- Concrete mixer
- Trowel
- Plumb bomb
- Spirit levels
- Pipe wrench
- Pliers
- Hacksaw
- Welding machine
- Tester
- Voltmeter
- Ammeter
- Hammer

Materials and supplies
- Cement
- Water
- Sand
- Ballast
- Timber
- Damp proof materials
- Hessian cloth
- Reinforcement bars
- Steel
- Hoop iron
- BRC
- Masonry units
- Iron sheets

- Nails
- Pipes
- Pipe fittings
- Wires
- Meter box
- Gutters
- Rainwater drop pipe
- Manhole covers
- Sockets
- CCTVs
- Air conditioners
- Fans

Personal protective equipment (PPEs)
- Overall
- Helmet
- Safety boots
- Masks
- Gloves
- First aid kit
- Reflectors
- Safety goggles

BUILDING DOORS AND WINDOWS INSTALLATION

UNIT CODE: CON/CU/BUT/CR/10/6/A

Relationship to Occupational Standards

This unit addresses the unit of competency: Install building doors and windows

Duration of Unit: 80 hours

Unit Description

This Unit describes the competences required to install building windows and doors. It involves preparing window and door schedule, fabricating/ordering building doors and windows, fixing building doors and windows and applying door and window finishes.

Summary of Learning Outcomes
1. Prepare door and window schedule
2. Fabricate/order doors and windows
3. Fix building doors and windows
4. Apply door and window finishes

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Prepare door and window schedule	• Construction dimensions • Types of doors and windows • Door and window detailing • Window and door schedule format • Conversion units	• Written Tests • Oral Questioning • Practical/Projects
2. Fabricate/order doors and windows	• Door and window details • Materials for making doors and windows • Fabrication methods for doors and windows • Functions of doors and windows • Tools and equipment	• Written Tests • Oral Questioning • Practical/Projects
3. Fix building doors and windows	• Iron mongery • Types of openings • Fixing methods • Tools and equipment	• Written Tests • Oral Questioning • Practical/Projects

4. Apply doors and window finishes	• Glazing methods • Painting • Plastering • Tools and equipment	• Written Tests • Oral Questioning • Practical/Projects

Suggested Methods of Instruction:
- Demonstration by trainer
- Practical work by trainee
- Demonstration videos
- Projects
- Group discussions

Recommended Resources
Tools and equipment
- Computers
- Calculators

Materials and supplies
- Stationery
- Files
- Journals
- Manuals
- Resource persons
- Chats

Personal protective equipment (PPEs)
- Safety goggles
- Dust coat
- First aid kits

SUPERVISING CONSTRUCTION PROJECTS

UNIT CODE:CON/CU/BUT/CR/11**/6/A**

Relationship to Occupational Standards

This unit addresses the unit of competency: Supervise construction project

Duration of Unit: 90 hours

Unit Description
This Unit describes the competences required to manage a construction project.
It involves organising construction site; interpreting building contract documents; preparing; project work plan, accounts; manage human resource, keeping site records & activities as well as participating in quality standards and costing construction projects.

Summary of Learning Outcomes
1. Organise construction site
2. Interpret building contract documents
3. Prepare construction work plan
4. Prepare accounts
5. Manage project human resource
6. Keep site records
7. Monitor site activities
8. Participate in quality standards
9. Cost construction cost

Learning Outcomes, Content and Suggested Assessment Methods

Learning Outcome	Content	Suggested Assessment Methods
1. Organise construction site	• Drawing construction site map • Construction site zones • Site infrastructure • Positioning of site equipment • Site installations • Confirmation of site arrangements	• Written Tests • Oral Questioning • Practical/Projects
2. Interpret building contract document	• Types of building contracts • Interpretation of contracts • Recording of contract information	• Written Tests • Oral Questioning • Practical/Projects

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3. Prepare construction work plan	• Project scope • Allocation • Project schedule	• Written Tests • Oral Questioning • Practical/Projects
4. Prepare accounts	• Trial balance • Profit and loss account • Balance sheet	• Written Tests • Oral Questioning • Practical/Projects
5. Manage project human resource	• Project roles and responsibilities • Documentation of staff management plan. • Developing project team • Monitoring • Evaluation • Analysis	• Written Tests • Oral Questioning • Practical/Projects
6. keep site records	• Types of records • Data entry methods • Record management systems • Record storage methods • ISO Certification	• Written Tests • Oral Questioning • Practical/Projects
7. Monitor site activities	• Building code • Project reports	• Written Tests • Oral Questioning • Practical/Projects
8. Participate in quality standards	• Quality control standards	• Written Tests • Oral Questioning • Practical/Projects
9. Cost construction project	• Project scope • Project items • Rating items • Final bills of quantities	• Written Tests • Oral Questioning • Practical/Projects

Suggested Methods of Instruction:
- Demonstration by trainer
- Practical work by trainee

- Demonstration videos
- Projects
- Group discussions

Recommended Resources
Tools and equipment
- Computers
- Calculators

Materials and supplies
- Stationery
- Files
- Journals
- Manuals
- Resource persons
- Chats

Personal protective equipment (PPEs)
- Safety goggles
- Dust coat
- First aid kits