



**TVET CURRICULUM DEVELOPMENT, ASSESSMENT AND CERTIFICATION
COUNCIL (TVET CDACC)**

NATIONAL OCCUPATIONAL STANDARDS

FOR

ICT TECHNICIAN

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 Kenya's development blue print 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 (Sessional 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 these Occupational Standards were developed for the purpose of developing a competency-based curriculum for ICT Technician Level 6. These Occupational Standards will also be the basis for assessment of an individual for competence certification.

It is my conviction that these Occupational Standards will play a great role towards development of competent human resource for the ICT sector's growth and sustainable development.

**PRINCIPAL SECRETARY, VOCATIONAL AND TECHNICAL TRAINING
MINISTRY OF EDUCATION**

PREFACE

The TVET Curriculum Development, Assessment and Certification Council (TVET CDACC), in conjunction with ICT Sector Skills Advisory Committee (SSAC) have developed these Occupational Standards for an ICT Technician. These standards will be the bases for development of a competency-based curriculum for ICT Technician Level 6. These Standards will also be the bases for assessment of an individual for competence certification.

The occupational standards are designed and organized with clear performance criteria for each element of a unit of competency. These standards also outline the required knowledge and skills as well as evidence guide.

I am grateful to the Council Members, Council Secretariat, ICT SSAC, expert workers and all those who participated in the development of these occupational standards.

Prof. CHARLES M. M. ONDIEKI, PhD, FIET (K), Con. Eng. Tech.
CHAIRMAN, TVET CDACC

ACKNOWLEDGMENT

These Occupational Standards were developed through combined effort of various stakeholders from private and public organizations. I am sincerely thankful to the management of these organizations for allowing their staff to participate in this course. I wish to acknowledge the invaluable contribution of industry players who provided inputs towards the development of these Standards.

I thank TVET Curriculum Development, Assessment and Certification Council (TVET CDACC) for providing guidance on the development of these Standards. My gratitude goes to the ICT Sector Skills Advisory Committee (SSAC) members for their contribution to the development of these Standards. I thank all the individuals and organizations who participated in the validation of these Standards.

I acknowledge all other institutions which in one way or another contributed to the development of these Standards.

CHAIRMAN ICT SECTOR SKILLS ADVISORY COMMITTEE

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ACRONYMS

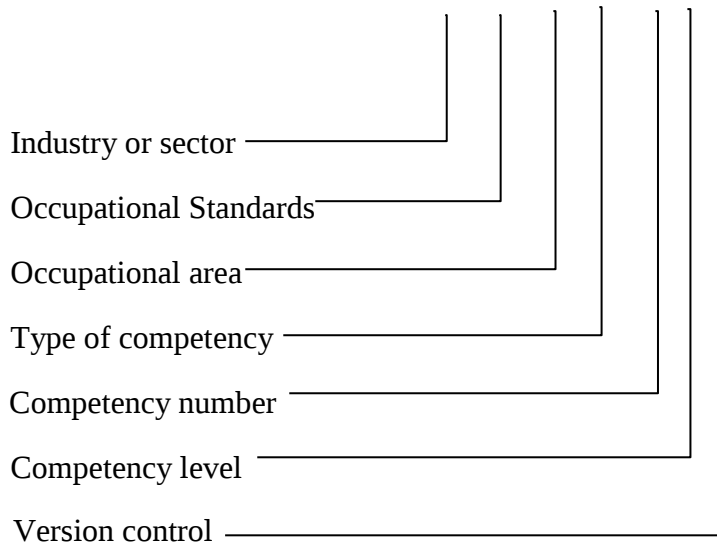
CAD	Computer Aided Design
CCTV	Closed Circuit Television
CDACC	Curriculum Development, Assessment and Certification Council
DMA	Direct Memory Access
DTP	Desktop Publishing
DSS	Decision Support System
EMS	Environmental Management Systems
ERP	Enterprise Resource Planning
FIFO	First In First Out
HSE	Health, safety and environment
HTTP	Hypertext Transfer Protocol
ICT	Information Communication Technology
IS	Information system
ISP	Information security policy
KCSE	Kenya Certificate of Secondary Education
KNQA	Kenya National Qualification Authority
KNQF	Kenya National Qualification Framework
LAN	Local Area Network
MIS	Management Information System
OIS	Operation Information System
OSH	Occupational Health and Safety
PAN	Personal Area Network
POST	Power on Self-Test
PPE	Personal Protective Equipment
RAM	Random Access Memory
SDLC	System Development life cycle
SSFT	Shortest Seek Time First
TVET	Technical and Vocational Education and Training

TPS Transaction Processing System

WAN Wide Area Network

KEY TO UNIT CODE

IT/OS/ICT/BC/01/6 A



COURSE OVERVIEW

ICT Technician Level 6 qualification consists of competencies that a person must achieve to enable him/her to be certified as an ICT technician.

ICT Technician is a person who can demonstrate underpinning knowledge and competence in Supporting or enabling the use of ICT equipment and applications, selecting appropriate ICT resources, techniques, configurations, procedures and methods, Installing, operating, and maintaining ICT systems.

Therefore, an ICT technician is a well-trained person who can carry out these responsibilities. These responsibilities comprise the units of competency of an ICT Technician certificate level 6 which include the following basic and core competencies:

BASIC COMPETENCIES

1. Demonstrate communication skills
2. Demonstrate Numeracy Skills
3. Demonstrate digital literacy
4. Demonstrate entrepreneurial skills
5. Demonstrate employability skills
6. Demonstrate environmental literacy
7. Demonstrate occupational safety and health practices

COMMON COMPETENCIES

1. Apply Basic Electronics

CORE COMPETENCIES

1. Perform Computer Networking
2. Install Computer software
3. Control ICT Security Threats
4. Perform ICT System Support
5. Perform Website Design
6. Perform Computer Repair and Maintenance
7. Manage Database System
8. Perform Management Information System
9. Perform Graphic Design
10. Develop Computer program
11. Develop Mobile Application

12. Perform System Analysis and Design

BASIC UNITS OF COMPETENCY

DEMONSTRATE COMMUNICATION SKILLS

UNIT CODE: IT/OS/ICT/BC/01/6/A

UNIT DESCRIPTION

This unit covers the competencies required in meeting communication needs of clients and colleagues; developing, establishing, maintaining communication pathways and strategies. It also covers competencies for conducting interview, facilitating group discussion and representing the organization in various forums.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT	PERFORMANCE CRITERIA
These describe the key outcomes which make up workplace function	These are assessable statements which specify the required level of performance for each of the elements. <i>Bold and italicized terms are elaborated in the Range</i>
1. Meet communication needs of clients and colleagues	1.1 Specific communication needs of clients and colleagues are identified and met 1.2 Different approaches are used to meet communication needs of clients and colleagues 1.3 Conflict is addressed promptly and in a timely way and in a manner, which does not compromise the standing of the organization
2. Develop communication strategies	2.1 Strategies for effective internal and external dissemination of information are developed to meet the organization's requirements 2.2 Special communication needs are considered in developing strategies to avoid discrimination in the workplace 2.3 Communication <i>strategies</i> are analyzed, evaluated and revised where necessary to make sure they are effective
3. Establish and maintain communication pathways	3.1 Pathways of communication are established to meet requirements of organization and workforce 3.2 Pathways are maintained and reviewed to ensure personnel are informed of relevant information
4. Promote use of communication strategies	4.1 Information is provided to all areas of the organization to facilitate implementation of the strategy 4.2 Effective communication techniques are articulated and modelled to the workforce 4.3 Personnel are given guidance about adapting communication strategies to suit a range of contexts
5. Conduct interview	5.1 A range of appropriate communication strategies are employed in <i>interview situations</i> 5.2 Records of interviews are made and maintained in accordance with

	organizational procedures 5.3 Effective questioning, listening and nonverbal communication techniques are used to ensure that required message is communicated
6. Facilitate group discussion	6.1 Mechanisms which enhance effective group interaction is defined and implemented 6.2 Strategies which encourage all group members to participate are used routinely 6.3 Objectives and agenda for meetings and discussions are routinely set and followed 6.4 Relevant information is provided to group to facilitate outcomes 6.5 Evaluation of group communication strategies is undertaken to promote participation of all parties 6.6 Specific communication needs of individuals are identified and addressed
7. Represent the organization	7.1 When participating in internal or external forums, presentation is relevant, appropriately researched and presented in a manner to promote the organization 7.2 Presentation is clear and sequential and delivered within a predetermined time 7.3 Appropriate media is utilized to enhance presentation 7.4 Differences in views are respected 7.5 Written communication is consistent with organizational standards 7.6 Inquiries are responded in a manner consistent with organizational standard

RANGE

This section provides work environment and conditions to which the performance criteria apply. It allows for different work environment and situations that will affect performance.

Variable	Range
Communication strategies include but not limited to:	• Language switch • Comprehension check • Repetition • Asking confirmation • Paraphrase • Clarification request • Translation • Restructuring • Approximation • Generalization

Effective group interaction includes but not limited to:	• Identifying and evaluating what is occurring within an interaction in a nonjudgmental way • Using active listening • Making decision about appropriate words, behavior • Putting together response which is culturally appropriate • Expressing an individual perspective • Expressing own philosophy, ideology and background and exploring impact with relevance to communication
Situations include but not limited to:	• Establishing rapport • Eliciting facts and information • Facilitating resolution of issues • Developing action plans • Diffusing potentially difficult situations

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit of competency.

Required Skills

The individual needs to demonstrate the following skills:

- Effective communication
- Active listening
- Giving/receiving feedback
- Interpretation of information
- Role boundaries setting
- Negotiation
- Establishing empathy
- Openness and flexibility in communication
- Communication skills required to fulfill job roles as specified by the organization
- Writing communications strategy
- Applying key elements of communications strategy

Required Knowledge

The individual needs to demonstrate knowledge of:

- Communication process
- Dynamics of groups and different styles of group leadership
- Communication skills relevant to client groups
- Flexibility in communication
- Communication skills relevant to client groups

Key elements of communications strategy

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

1. Critical aspects of Competency	Assessment requires evidence that the candidate: 1.1 Developed communication strategies to meet the organization requirements and applied in the workplace 1.2 Established and maintained communication pathways for effective communication in the workplace 1.3 Used communication strategies involving exchanges of complex oral information
2. Resource Implications	The following resources should be provided: 4. 1Access to relevant workplace or appropriately simulated environment where assessment can take place 4. 2Materials relevant to the proposed activity or tasks
3. Methods of Assessment	Competency in this unit may be assessed through: 3.1 Direct Observation/Demonstration with Oral Questioning 3.2 Written Examination
4. Context of Assessment	Competency may be assessed individually in the actual workplace or through accredited institution
5. Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.

DEMONSTRATE NUMERACY SKILLS

UNIT CODE: IT/OS/ICT/BC/02/6/A

UNIT DESCRIPTION

This unit describes the competencies required by a worker in order to apply a wide range of mathematical calculations for work; apply ratios, rates and proportions to solve problems; estimate, measure and calculate measurement for work; Use detailed maps to plan travel routes for work; Use geometry to draw and construct 2D and 3D shapes for work; Collect, organize and interpret statistical data; Use routine formula and algebraic expressions for work and use common functions of a scientific calculator

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT These describe the key outcomes which make up workplace function.	PERFORMANCE CRITERIA These are assessable statements which specify the required level of performance for each of the elements. <i>Bold and italicized terms are elaborated in the Range.</i>
1. Apply a wide range of mathematical calculations for work	1.1 Mathematical information embedded in a range of workplace tasks and texts is extracted 1.2 Mathematical information is interpreted and comprehended 1.3 A range of mathematical and problem solving processes are select and used 1.4 Different forms of fractions, decimals and percentages are flexibly used 1.5 Calculation performed with positive and negative numbers 1.6 Numbers are expressed as powers and roots and are used in calculations 1.7 Calculations done using routine formulas 1.8 Estimation and assessment processes are used to check outcome 1.9 Mathematical language is used to discuss and explain the processes, results and implications of the task
2. Use and apply ratios, rates and proportions for work	2.1 Information regarding ratios, rates and proportions extracted from a range of workplace tasks and texts 2.2 Mathematical information related to ratios, rate and proportions is analyzed 2.3 Problem solving processes are used to undertake the task 2.4 Equivalent ratios and rates are simplified 2.5 Quantities are calculated using ratios, rates and proportions 2.6 Graphs, charts or tables are constructed to represent ratios, rates and proportions 2.6 The outcomes reviewed and checked

	2.7 Information is record using mathematical language and symbols
3. Estimate, measure and calculate measurement for work	3.1 Measurement information embedded in workplace texts and tasks are extracted and interpreted 3.2 Appropriate workplace measuring equipment are identified and selected 3.3 Accurate measurements are estimate and made 3.4 The area of 2D shapes including compound shapes are calculated 3.5 The volume of 3D shapes is calculated using relevant formulas 3.6 Sides of right angled triangles are calculated using Pythagoras' theorem 3.7 conversions are perform between units of measurement 3.8 Problem solving processes are used to undertake the task 3.9 The measurement outcomes are reviewed and checked 3.10 Information is recorded using mathematical language and symbols appropriate for the task
4. Use detailed maps to plan travel routes for work	4.1 Different types of maps are identified and interpreted 4.2 Key features of maps are identified 4.3 Scales are identified and interpreted 4.4 Scales are applied to calculate actual distances 4.5 Positions or locations are determined using directional information 4.6 Routes are planned by determining directions and calculating distances, speeds and times 4.7 Information is gathered and identified and relevant factors related to planning a route checked 4.8 Relevant equipment is select and checked for accuracy and operational effectiveness 4.9 Task is planned and recorded using specialized mathematical language and symbols appropriate for the task
5. Use geometry to draw 2D shapes and construct 3D shapes for work	5.1 A range of 2D shapes and 3D shapes and their uses in work contexts is identified 5.2 Features of 2D and 3D shapes are named and described 5.3 Types of angles in 2D and 3D shapes are identified 5.4 Angles are drawn, estimated and measured using geometric instruments 5.5 Angle properties of 2D shapes are named and identified 5.6 Angle properties are used to evaluate unknown angles in shapes 5.7 Properties of perpendicular and parallel lines are applied to

	shapes 5.8 Understanding and use of symmetry is demonstrated 5.9 Understanding and use of similarity is demonstrated 5.10 The workplace tasks and mathematical processes required are identified 5.11 2D shapes is drawn for work 5.12 3D shapes is constructed for work 5.13 The outcomes are reviewed and checked 5.14 Specialized mathematical language and symbols appropriate for the task are used
6. Collect, organize, and interpret statistical data for work	6.1 Workplace issue requiring investigation are identified 6.2 Audience / population / sample unit is determined 6.3 Data to be collected is identified 6.4 Data collection method is selected 6.5 Appropriate statistical data is collected and organized 6.6 Data is illustrated in appropriate formats 6.7 The effectiveness of different types of graphs are compared 6.8 The summary statistics for collected data is calculated 6.9 The results / findings are interpreted 6.10 Data is checked to ensure that it meets the expected results and content 6.11 Information from the results including tables, graphs and summary statistics is extracted and interpreted 6.12 Mathematical language and symbols are used to report results of investigation
7. Use routine formula and algebraic expressions for work	7.1 Understanding of informal and symbolic notation, representation and conventions of algebraic expressions is demonstrated 7.2 Simple algebraic expressions and equations are developed 7.3 Operate on algebraic expressions 7.4 Algebraic expressions are simplified 7.5 Substitution into simple routine equations is done 7.6 Routine formulas used for work tasks are identified and comprehended 7.7 Routine formulas are evaluate by substitution 7.8 Routine formulas transposed 7.9 Appropriate formulas are identified and used for work related tasks 7.10 Outcomes are checked and result of calculation used
8. Use common functions of a scientific	8.1 Required numerical information to perform tasks is located 8.2 The order of operations and function keys necessary to

calculator for work	solve mathematical calculation are determined 8.3 Function keys on a scientific calculator are identified and used 8.4 Estimations are referred to check reasonableness of problem solving process 8.5 Appropriate mathematical language, symbols and conventions are used to report results
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RANGE

This section provides work environments and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

Variable	Range
1. Geometry	May include but not limited to: 2.1 Scale drawing 2.2 Triangles 2.3 Simple solid 2.4 Round 2.5 Square 2.6 Rectangular 2.7 Triangle 2.8 Sphere 2.9 Cylinder 2.10 Cube 2.11 Polygons 2.12 Cuboids

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit of competency.

Required Skills

The individual needs to demonstrate the following skills:

- Applying Fundamental operations (addition, subtraction, division, multiplication)
- Using calculator
- Using different measuring tools

Required knowledge

The individual needs to demonstrate knowledge of:

- Types of common shapes
- Differentiation between two dimensional shapes / objects

- Formulae for calculating area and volume
- Types and purpose of measuring instruments
- Units of measurement and abbreviations
- Fundamental operations (addition, subtraction, division, multiplication)
- Rounding techniques
- Types of fractions
- Different types of tables and graphs
- Meaning of graphs, such as increasing, decreasing, and constant value
- Preparation of basic data, tables & graphs

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

1. Critical aspects of Competency	Assessment requires evidence that the candidate: 1.5 1.1 Performed Calculation involving positive and negative numbers 1.2 Used numbers expressed as powers and roots in calculations 1.3. Simplified rates and ratios 1.4 Constructed graphs, charts and tables to represent ratios, rates and proportions 1.6 Calculated volume of 3D shapes using relevant formulas 1.7 Calculated sides of right-angle triangles using Pythagoras' theorem 1.8 Applied scales in calculation of actual distances 1.9 Planned routes by determining directions, distance calculation speeds and time 1.10 Identified angles in 2D and 3D shapes 1.11 Used angle properties to evaluate unknown angles 1.12 Applied properties of perpendicular and parallel lines in shapes construction 1.13 Collected and organized appropriate statistical data. 1.14 Simplified algebraic expressions 1.15 Identified and used appropriate formulas for work related tasks 1.16 Identified and used function keys of scientific calculator
2. Resource Implications	The following resources should be provided: 2.1 Access to relevant workplace or appropriately simulated environment where assessment can take place

	2.2 Materials relevant to the proposed activity or tasks
3. Methods of Assessment	Competency in this unit may be assessed through: 3.1 Direct Observation/Demonstration with Oral Questioning 3.2 Written Examination
4. Context of Assessment	Competency may be assessed individually in the actual workplace or through accredited institution
5. Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.

DEMONSTRATE DIGITAL LITERACY

UNIT CODE: IT/OS/ICT/BC/03/6/A

UNIT DESCRIPTION

This unit covers the competencies required to effectively use digital devices such as smartphones, tablets, laptops and desktop PCs. It entails identifying and using digital devices such as smartphones, tablets, laptops and desktop PCs for purposes of communication, work performance and management at the work place.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT	PERFORMANCE CRITERIA
These describe the key outcomes which make up workplace function	These are assessable statements which specify the required level of performance for each of the elements. <i>Bold and italicized terms are elaborated in the Range</i>
1. Identify appropriate computer software and hardware	1.1 Concepts of ICT are determined in accordance with computer equipment 1.2 Classifications of computers are determined in accordance with manufacturers specification 1.3 <i>Appropriate computer software</i> is identified according to manufacturer's specification

	1.4 Appropriate computer hardware is identified according to manufacturer's specification 1.5 Functions and commands of operating system are determined in accordance with manufacturer's specification
2. Apply security measures to data, hardware, software in automated environment	2.1 Data security and privacy are classified in accordance with the prevailing technology 2.2 Security threats reidentified and control measures are applied in accordance with laws governing protection of ICT 2.3 Computer threats and crimes are detected. 2.4 Protection against computer crimes is undertaken in accordance with laws governing protection of ICT
3. Apply computer software in solving tasks	3.1 Word processing concepts are applied in resolving workplace tasks, report writing and documentation 3.2 Word processing utilities are applied in accordance with workplace procedures 3.3 Worksheet layout is prepared in accordance with work procedures 3.4 Worksheet is build and data manipulated in the worksheet in accordance with workplace procedures 3.5 Continuous data manipulated on worksheet is undertaken in accordance with work requirements 3.6 Database design and manipulation is undertaken in accordance with office procedures 3.7 Data sorting, indexing, storage, retrieval and security is provided in accordance with workplace procedures
4. Apply internet and email in communication at workplace	4.1 Electronic mail addresses are opened and applied in workplace communication in accordance with office policy 4.2 Office internet functions are defined and executed in accordance with office procedures 4.3 Network configuration is determined in accordance with office operations procedures 4.4 Official World Wide Web is installed and managed according to workplace procedures
5. Apply Desktop publishing in official assignments	5.1 Desktop publishing functions and tools are identified in accordance with manufactures specifications 5.2 Desktop publishing tools are developed in accordance with work requirements 5.3 Desktop publishing tools are applied in accordance with workplace requirements 5.4 Typeset work is enhanced in accordance with workplace standards
6. Prepare presentation	6.1 Types of presentation packages are identified in accordance with office requirements

packages	6.2 Slides are created and formulated in accordance with workplace procedures 6.3 Slides are edited and run in accordance with work procedures 6.4 Slides and handouts are printed according to work requirements
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RANGE

This section provides work environments and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

Variable	Range
Appropriate computer software may include but not limited to:	A collection of instructions or computer tools that enable the user to interact with a <i>computer</i> , its hardware, or perform tasks.
Appropriate computer hardware may include but not limited to:	Collection of physical parts of a computer system such as; • Computer case, monitor, keyboard, and mouse • All the parts inside the computer case, such as the hard disk drive, motherboard and video card
Data security and privacy may include but not limited to:	• Confidentiality of data • Cloud computing • Integrity -but-curious data surfing
Security and control measures may include but not limited to:	• Counter measures against cyber terrorism • Risk reduction • Cyber threat issues • Risk management • Pass-wording
Security threats may include but not limited to:	• Cyber terrorism • Hacking
Word processing concepts may include but not limited to:	Using a special program to create, edit and print documents
Network configuration may include but not limited to:	Organizing and maintaining information on the components of a computer network

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit of competency.

Required Skills

The individual needs to demonstrate the following skills:

- Analytical skills
- Interpretation
- Typing
- Communication
- Computing (applying fundamental operations such as addition, subtraction, division and multiplication)
- Using calculator
- Basic ICT skills

Required Knowledge

The individual needs to demonstrate knowledge of:

- Software concept
- Functions of computer software and hardware
- Data security and privacy
- Computer security threats and control measures
- Technology underlying cyber-attacks and networks
- Cyber terrorism
- Computer crimes
- Detection and protection of computer crimes
- Laws governing protection of ICT
- Word processing;
 - ✓ Functions and concepts of word processing.
 - ✓ Documents and tables creation and manipulations
 - ✓ Mail merging
 - ✓ Word processing utilities
- Spread sheets;
 - ✓ Meaning, formulae, function and charts, uses and layout
 - ✓ Data formulation, manipulation and application to cells
 - ✓
- Database;
 - ✓ Database design, data manipulation, sorting, indexing, storage retrieval and security
- Desktop publishing;
 - ✓ Designing and developing desktop publishing tools
 - ✓ Manipulation of desktop publishing tools
 - ✓ Enhancement of typeset work and printing documents
- Presentation Packages;
 - ✓ Types of presentation Packages
 - ✓ Creating, formulating, running, editing, printing and presenting slides and handouts
- Networking and Internet;
 - ✓ Computer networking and internet.

- ✓ Electronic mail and world wide web
- Emerging trends and issues in ICT;
 - ✓ Identify and integrate emerging trends and issues in ICT
 - ✓ Challenges posed by emerging trends and issues

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

1. Critical Aspects of Competency	Assessment requires evidence that the candidate: 1.1 Identified and controlled security threats 1.2 Detected and protected computer crimes 1.3 Applied word processing in office tasks 1.4 Designed, prepared work sheet and applied data to the cells in accordance to workplace procedures 1.5 Opened electronic mail for office communication as per workplace procedure 1.6 Installed internet and World Wide Web for office tasks in accordance with office procedures 1.7 Integrated emerging issues in computer ICT applications 1.8 Applied laws governing protection of ICT
2. Resource Implications	2.1 Tablets 2.2 Laptops and 2.3 Desktop PCs 2.4 Desktop computer 2.5 Lap top 2.6 Calculator 2.7 Internet 2.8 Smart phone 2.9 Operations Manuals
3. Methods of Assessment	Competency may be assessed through: 3.1 Written Test 3.2 Demonstration 3.3 Practical assignment 3.4 Interview/Oral Questioning 3.5 Demonstration
4. Context of Assessment	Competency may be assessed in an off and on the job setting
5. Guidance information for	Holistic assessment with other units relevant to the industry sector,

assessment	workplace and job role is recommended.
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DEMONSTRATE UNDERSTANDING OF ENTREPRENEURSHIP

UNIT CODE : IT/OS/ICT/BC/04/6/A

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.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT	PERFORMANCE CRITERIA
1. Demonstrate understanding of an Entrepreneur	1.1 Entrepreneurs and Business persons are distinguished as per <i>principles of entrepreneurship</i> 1.2 <i>Types of entrepreneurs</i> are identified as per principles of entrepreneurship 1.3 Ways of becoming an Entrepreneur are identified as per principles of Entrepreneurship 1.4 <i>Characteristics of Entrepreneurs</i> are identified as per principles of Entrepreneurship 1.5 Factors affecting Entrepreneurship development are explored as per principles of Entrepreneurship

2. Demonstrate understanding of Entrepreneurship and self-employment	2.1 Entrepreneurship and self-employment are distinguished as per principles of entrepreneurship 2.2 Importance of self-employment is analysed based on business procedures and strategies 2.3 Requirements for entry into self-employment are identified according to business procedures and strategies 2.4 Role of an Entrepreneur in business is determined according to business procedures and strategies 2.5 Contributions of Entrepreneurs to National development are identified as per business procedures and strategies 2.6 Entrepreneurship culture in Kenya is explored as per business procedures and strategies 2.7 Born or made Entrepreneurs are distinguished as per entrepreneurial traits
3. Identify Entrepreneurship opportunities	3.1 Sources of business ideas are identified as per business procedures and strategies 3.2 Business ideas and opportunities are generated as per business procedures and strategies 3.3 Business life cycle is analysed as per business procedures and strategies 3.4 Legal aspects of business are identified as per procedures and strategies 3.5 Product demand is assessed as per market strategies 3.6 Types of business environment are identified and evaluated as per business procedures 3.7 Factors to consider when evaluating business environment are explored based on business procedure and strategies 3.8 Technology in business is incorporated as per best practice

4. Create entrepreneurial awareness	4.1 Forms of businesses are explored as per business procedures and strategies 4.2 Sources of business finance are identified as per business procedures and strategies 4.3 Factors in selecting source of business finance are identified as per business procedures and strategies 4.4 Governing policies on Small Scale Enterprises (SSEs) are determined as per business procedures and strategies 4.5 Problems of starting and operating SSEs are explored as per business procedures and strategies
5. Apply entrepreneurial motivation	5.1 Internal and external motivation factors are determined in accordance with motivational theories 5.2 Self-assessment is carried out as per entrepreneurial orientation 5.3 Effective communications are carried out in accordance with communication principles 5.4 Entrepreneurial motivation is applied as per motivational theories
6. Develop innovative business strategies	6.1 Business innovation strategies are determined in accordance with the organization strategies 6.2 Creativity in business development is demonstrated in accordance with business strategies 6.3 Innovative business strategies are developed as per business principles 6.4 Linkages with other entrepreneurs are created as per best practice 6.5 ICT is incorporated in business growth and development as per best practice

7. Develop Business Plan	7.1 Identified Business is described as per business procedures and strategies 7.2 Marketing plan is developed as per business plan format 7.3 Organizational/Management plan is prepared in accordance with business plan format 7.4 Production/operation plan in accordance with business plan format 7.5 Financial plan is prepared in accordance with the business plan format 7.6 Executive summary is prepared in accordance with business plan format 7.7 Business plan is presented as per best practice
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RANGE

This section provides work environment and conditions to which the performance criteria apply. It allows for different work environment and situations that will affect performance.

Variable	Range include but not limited to:
1. Types of entrepreneurs but not limited to:	1.1 Innovators 1.2 Imitators 1.3 Craft 1.4 Opportunistic 1.5 Speculators
2. Principles of Entrepreneurship but not limited to:	2.1 Visionary 2.2 Solution provider 2.3 Accountability 2.4 Growth and marketing 2.5 Resilient 2.6 Tenacious

3. Characteristics of Entrepreneurs include but not limited to:	3.1 Creative 3.2 Innovative 3.3 Planner 3.4 Risk taker 3.5 Networker 3.6 Confident 3.7 Flexible 3.8 Persistent 3.9 Patient 3.10 Independent 3.11 Future oriented 3.12 Goal oriented
4. Requirements for entry into self-employment	4.1 Technical skills 4.2 Management skills 4.3 Entrepreneurial skills 4.4 Resources 4.5 Infrastructure
5. Internal motivation include but not limited to:	5.1 Interest 5.2 Passion 5.3 Freedom 5.4 Prestige
6. Business environment	6.1 External 6.2 Internal 6.3 Intermediate
7. Forms of businesses	7.1 Sole proprietorship 7.2 Partnership 7.3 Limited companies 7.4 Cooperatives
8. Governing policies	8.1 Increasing scope for finance 8.2 Promoting cooperation between entrepreneurs and private sector 8.3 Reducing regulatory burden on entrepreneurs 8.4 Developing IT tools for entrepreneurs
9. External motivation include but not limited to:	9.1 Rewards 9.2 Punishment

	9.3 Enabling environment 9.4 Government policies
10. Entrepreneurial orientation include but not limited to:	10.1 Passion 10.2 Interest 10.3 Hobbies 10.4 Skills
11. Innovative business strategies include but not limited to:	11.1 New products 11.2 New methods of production 11.3 New markets 11.4 New sources of supplies 11.5 Change in industrialization
12. Communication principles include but not limited to:	12.1 Feed back 12.2 Attention 12.3 Clarity 12.4 Timeliness 12.5 Adequacy 12.6 Consistency 12.7 Informality
13. Motivational theories include but not limited to:	13.1 Marslows theory 13.2 McClelland theory 13.3 Fredrick Tylors theory

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit of competency.

Required Skills

The individual needs to demonstrate the following skills:

- Assessing a range of alternative products and strategies
- Critically analyzing information, summarizing and making sense of previous and current market trends
- Identifying changing consumer preferences and demographics
- Thinking “outside the box”
- Ensuring quality consistency
- Reducing lead time to product/service delivery
- Management
- Using formal problem-solving procedures, e. g., root-cause analysis, six sigmas
- Communication
- Applying motivational principles, e. g., positive stroking, behavior modification

- Assessing range of alternatives rather than choosing the easiest option
- Achieving ownership and credibility for the enterprise vision
- Critically analyzing information, summarizing and making sense of previous and current market trends
- Developing solutions and practical strategies which are “outside the box”

Required Knowledge

The individual needs to demonstrate knowledge of:

- Entrepreneurial competencies
 - ✓ Decision making
 - ✓ Business communication
 - ✓ Change management
 - ✓ Coping with competition
 - ✓ Risk taking
 - ✓ Net working
 - ✓ Time management
 - ✓ Leadership
- Factors affecting entrepreneurship development
- Principles of Entrepreneurship
- Features and benefits of common operational practices, e. g., continuous improvement (kaizen), waste elimination,
- Conflict resolution
- Health, safety and environment (HSE) principles and requirements
- Customer care strategies
- Basic financial management
- Business strategic planning
- Impact of change on individuals, groups and industries
- Government and regulatory processes
- Local and international market trends
- Product promotion strategies
- Market and feasibility studies
- Government and regulatory processes
- Local and international business environment
- Concepts of change management
- Relevant developments in other industries
- Regional/ County business expansion strategies
- Innovation in business

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

1. Critical Aspects of Competency	Assessment requires evidence that the candidate: 1.1 Distinguished entrepreneurs and business persons correctly 1.2 Identified ways of becoming an entrepreneur appropriately 1.3 Explored factors affecting entrepreneurship development appropriately 1.4 Analysed importance of self-employment accurately 1.5 Identified requirements for entry into self-employment correctly 1.6 Identified sources of business ideas correctly 1.7 Generated Business ideas and opportunities correctly 1.8 Analysed business life cycle accurately 1.9 Identified legal aspects of business correctly 1.10 Assessed product demand accurately 1.11 Determined Internal and external motivation factors appropriately 1.12 Carried out communications effectively 1.13 Identified sources of business finance correctly 1.14 Determined Governing policy on small scale enterprise appropriately 1.15 Explored problems of starting and operating SSEs effectively 1.16 Developed Marketing, Organizational/Management, Production/Operation and Financial plans correctly 1.17 Prepared executive summary correctly 1.18 Determined business innovative strategies appropriately 1.19 Presented business plan effectively
2. Resource Implications	The following resources should be provided: 2.1 Check list 2.2 Research tools (Questionnaire, interview guide, observation schedule) 2.3 Materials, tools, equipment and machines relevant
3. Methods of Assessment	3.1 Written tests 3.2 Observation 3.3 Oral questions 3.4 Third party report 3.5 Interviews 3.6 Case problems 3.7 Portfolio
4. Context of	4.1 Competency may be assessed in workplace or in a simulated

Assessment	workplace setting 4.2 Assessment shall be observed while tasks are being undertaken whether individually or in-group
5. Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.

DEMONSTRATE EMPLOYABILITY SKILLS

UNIT CODE: IT/OS/ICT/BC/05/6/A

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.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT	PERFORMANCE CRITERIA
These describe the key outcomes which make up workplace function.	These are assessable statements which specify the required level of performance for each of the elements. <i>Bold and italicized terms are elaborated in the Range</i>
1. Conduct self-management	1.1 Personal vision, mission and goals are formulated based on potential and in relation to organization objectives 1.2 Emotions are managed as per workplace requirements 1.3 Individual performance is evaluated and monitored according to the agreed targets. 1.4 Assertiveness is developed and maintained based on the requirements of the job. 1.5 Accountability and responsibility for own actions are demonstrated. 1.6 Self-esteem and a positive self-image are developed and maintained. 1.7 Time management, attendance and punctuality are observed as per the organization policy. 1.8 Goals are managed as per the organization's objective 1.9 Self-strengths and weaknesses are identified as per <i>personal objectives</i> 1.10 Critics are managed as per personal objectives
2. Demonstrate interpersonal communication	2.1 Listening and understanding is demonstrated as per communication policy 2.2 Writing to the needs of the audience is demonstrated as per communication policy 2.3 Speaking, reading and writing is demonstrated as per communication policy 2.4 Negotiation skills are demonstrated as per communication

	policy 2.5 Empathizing is demonstrated as per the communication policy 2.6 Numeracy is applied as per the communication policy 2.7 Internal and external customers' needs are identified and interpreted as per the communication policy 2.8 Persuasion is demonstrated as per the communication policy 2.9 Communication networks are established as per the SOPs 2.10 Information is shared as per communication structure
3. Demonstrate critical safe work habits	3.1 Stress is managed in accordance with workplace procedures. 3.2 Punctuality and time consciousness is demonstrated in line with workplace policy. 3.3 Personal objectives are integrated with organization goals based on organization's strategic plan. 3.4 Resources are utilized in accordance with workplace policy. 3.5 Work priorities are set in accordance to workplace procedures. 3.6 Leisure time is recognized in line with organization policy. 3.7 Abstinence from drug and substance abuse is observed as per workplace policy. 3.8 Awareness of HIV and AIDS is demonstrated in line with workplace requirements. 3.9 Safety consciousness is demonstrated in the workplace based on organization safety policy. 3.10 Emerging issues are dealt with in accordance with organization policy.
4. Lead a workplace team	4.1 Performance expectations for the team are set 4.2 Duties and responsibilities are assigned in accordance with the organization policy. 4.3 Team parameters and relationships are identified according to set rules and regulations. 4.4 Forms of communication in a team are established according to office policy. 4.5 Communication is carried out as per workplace place policy and requirements of the job. 4.6 Team performance is supervised 4.7 Feedback on performance is collected and analyzed based on established team learning process 4.8 Conflicts are resolved between team members in line with organization rules and regulations. 4.9 Gender mainstreaming is undertaken in accordance with set regulations. 4.10 Human rights are adhered to in accordance with existing

	protocol. 4.11 Healthy relationships are developed and maintained for harmonious co-existence in line with workplace.
5. Plan and organize work	5.1 Task requirements are identified as per the workplace objectives 5.2 Task is interpreted in accordance with safety (OHS), environmental requirements and quality requirements 5.3 Work activity is organized with other involved personnel as per the SOPs 5.4 Resources are mobilized, allocated and utilized to meet project goals and deliverables. 5.5 Work activities are monitored and evaluated in line with organization procedures. 5.6 Job planning is documented in accordance with workplace requirements. 5.7 Planning and organizing of work activities is reviewed as per the workplace requirements 5.8 Time is managed achieve workplace set goals and objectives.
6. Maintain professional growth and development	6.1 Personal training needs are identified and assessed in line with the requirements of the job. 6.2 Training and career opportunities are identified and availed based on job requirements. 6.3 Resources for training are mobilized and allocated based organizations skills needs. 6.4 Licensees and certifications relevant to job and career are obtained and renewed. 6.5 Personal growth is pursued towards improving the qualifications set for the profession. 6.6 Work priorities and commitments are managed based on requirement of the job and workplace policy. 6.7 Recognitions are sought as proof of career advancement in line with professional requirements.
7. Demonstrate workplace learning	7.1 Own learning is managed as per workplace policy. 7.2 Learning opportunities are sought and allocated based on job requirement and in line with organization policy. 7.3 Contribution to the learning community at the workplace is carried out. 7.4 Range of media for learning are established as per the training need 7.5 Application of learning is demonstrated in both technical and non-technical aspects based on requirements of the job 7.6 Enthusiasm for ongoing learning is demonstrated

	7.7 Time and effort is invested in learning new skills-based job requirements 7.8 Willingness to learn in different context is demonstrated based on available learning opportunities arising in the workplace. 7.9 Awareness of Occupational Health and Safety procedures are demonstrated in use of technology in the workplace. 7.10 Initiative is taken to create more effective and efficient processes and procedures in line with workplace policy. 7.11 New systems are developed and maintained in accordance with the requirements of the job. 7.12 Opportunities that are not obvious are identified and exploited in line with organization objectives. 7.13 Opportunities for performance improvement are identified proactively in area of work. 7.14 Awareness of personal role in workplace innovation is demonstrated.
8. Demonstrate problem solving skills	8.1 Creative, innovative and practical solutions are developed based on the problem 8.2 Independence and initiative in identifying and solving problems is demonstrated. 8.3 Team problems are solved as per the workplace guidelines 8.4 Problem solving strategies are applied as per the workplace guidelines 8.5 Problems are analyzed and assumptions tested as per the context of data and circumstances
9. Manage workplace ethics	9.1 Policies and guidelines are observed as per the workplace requirements 9.2 Self-worth and profession is exercised in line with personal goals and organizational policies 9.3 Code of conduct is observed as per the workplace requirements 9.4 Personal and professional integrity is demonstrated as per the personal goals 9.5 Commitment to jurisdictional laws is demonstrated as per the workplace requirements

RANGE

This section provides work environment and conditions to which the performance criteria apply. It allows for different work environment and situations that will affect performance.

Range	Variable
<i>Drug and substance abuse</i> include but not limited to:	Commonly abused • Alcohol • Tobacco • Miraa • Over-the-counter drugs • Cocaine • Bhang • Glue
<i>Feedback</i> includes but not limited to:	• Verbal • Written • Informal • Formal
<i>Relationships</i> includes but not limited to:	• Man/Woman • Trainer/trainee • Employee/employer • Client/service provider • Husband/wife • Boy/girl • Parent/child • Sibling relationships
<i>Forms of communication</i> include but not limited to:	• Written • Visual • Verbal • Non verbal • Formal and informal
<i>Team</i> includes but not limited to:	• Small work group • Staff in a section/department • Inter-agency group
<i>Personal growth</i> includes but not limited to:	• Growth in the job • Career mobility • Gains and exposure the job gives • Net workings • Benefits that accrue to the individual as a result of noteworthy performance
<i>Personal objectives</i> include but not limited to:	• Long term • Short term • Broad • Specific

<i>Trainings and career opportunities</i> includes but not limited to	• Participation in training programs ○ Technical ○ Supervisory ○ Managerial ○ Continuing Education • Serving as Resource Persons in conferences and workshops
<i>Resource</i> include but not limited to:	• Human • Financial • Technology ○ Hardware ○ Software
<i>Innovation</i> include but not limited to:	• New ideas • Original ideas • Different ideas • Methods/procedures • Processes • New tools
<i>Emerging issues</i> include but not limited to:	• Terrorism • Social media • National cohesion • Open offices
<i>Range of media for learning</i> include but not limited to:	• Mentoring • peer support and networking • IT and courses

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit of competency.

Required Skills

The individual needs to demonstrate the following skills:

- Personal hygiene practices
- Intra and Interpersonal skills
- Communication skills
- Knowledge management
- Interpersonal skills
- Critical thinking skills
- Observation skills
- Organizing skills
- Negotiation skills
- Monitoring skills

- Evaluation skills
- Record keeping skills
- Problem solving skills
- Decision Making skills
- Resource utilization skills
- Resource mobilization skills

Required Knowledge

The individual needs to demonstrate knowledge of:

- Work values and ethics
- Company policies
- Company operations, procedures and standards
- Occupational Health and safety procedures
- Fundamental rights at work
- Personal hygiene practices
- Workplace communication
- Concept of time
- Time management
- Decision making
- Types of resources
- Work planning
- Resources and allocating resources
- Organizing work
- Monitoring and evaluation
- Record keeping
- Workplace problems and how to deal with them
- Negotiation
- Assertiveness
- Team work
- Gender mainstreaming
- HIV and AIDS
- Drug and substance abuse
- Leadership
- Safe work habits
- Professional growth and development
- Technology in the workplace
- Learning
- Creativity
- Innovation
- Emerging issues
 - Social media

- Terrorism
- National cohesion

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

1. Critical aspects of Competency	Assessment requires evidence that the candidate: 1.1 Conducted self-management 1.2 Demonstrated interpersonal communication 1.3 Demonstrated critical safe work habits 1.4 Demonstrated the ability to lead a workplace team 1.5 Planned and organized work 1.6 Maintained professional growth and development 1.7 Demonstrated workplace learning 1.8 Demonstrated problem solving skills 1.9 Demonstrated the ability to manage ethical performance
2. Resource Implications	The following resources should be provided: 2.1 Case studies/scenarios
3. Methods of Assessment	Competency in this unit may be assessed through: • Oral Interview • Observation • Third Party Reports • Written
4. Context of Assessment	4.1 Competency may be assessed in workplace or in a simulated workplace setting 4.2 Assessment shall be observed while tasks are being undertaken whether individually or in-group
5. Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.

DEMONSTRATE ENVIRONMENTAL LITERACY

UNIT CODE: IT/OS/ICT/BC/06/6/A

UNIT DESCRIPTION

This unit specifies the competencies required to follow procedures for environmental hazard control, follow procedures for environmental pollution control, comply with workplace sustainable resource use, evaluate current practices in relation to resource usage, develop and adhere to environmental protection principles/strategies/guidelines, analyze resource use, develop resource conservation plans and implement selected plans.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT	PERFORMANCE CRITERIA
These describe the key outcomes which make up workplace function.	These are assessable statements which specify the required level of performance for each of the elements. <i>Bold and italicized terms are elaborated in the Range</i>
1. Control environmental hazard	1.1 <i>Storage methods</i> for environmentally hazardous materials are strictly followed according to environmental regulations and OSHS. 1.2 <i>Disposal methods</i> of hazardous wastes are followed at all times according to environmental regulations and OSHS. 1.3 <i>PPE</i> is used according to OSHS.
2. Control environmental Pollution control	2.1 Environmental pollution <i>control measures</i> are compiled following standard protocol. 2.2 Procedures for solid waste management are observed according Environmental Management and Coordination Act 1999 2.3 Methods for minimizing <i>noise pollution</i> complied following environmental regulations.
3. Demonstrate sustainable resource use	3.1 Methods for minimizing wastage are complied with. 3.2 Waste management procedures are employed following principles of 3Rs (Reduce, Reuse, Recycle) 3.3 Methods for economizing or reducing resource consumption are practiced.
4. Evaluate current practices in relation to resource usage	4.1 Information on resource efficiency systems and procedures are collected and provided to the work group where appropriate. 4.2 Current resource usage is measured and recorded by members of the work group. 4.3 Current purchasing strategies are analyzed and recorded according to industry procedures. 4.4 Current work processes to access information and data is analyzed following enterprise protocol.

5. Identify Environmental legislations/conventions for environmental concerns	5.1 Environmental legislations/conventions and local ordinances are identified according to the different environmental aspects/impact 5.2 Industrial standard/environmental practices are described according to the different environmental concerns
6. Implement specific environmental programs	6.1 Programs/Activities are identified according to organizations policies and guidelines. 6.2 Individual roles/responsibilities are determined and performed based on the activities identified. 6.3 Problems/constraints encountered are resolved in accordance with organizations' policies and guidelines 6.4 Stakeholders are consulted based on company guidelines
7. Monitor activities on Environmental protection/Programs	7.1 Activities are periodically monitored and Evaluated according to the objectives of the environmental program 7.2 Feedback from stakeholders are gathered and considered in Proposing enhancements to the program based on consultations 7.3 Data gathered are analyzed based on Evaluation requirements 7.4 Recommendations are submitted based on the findings 7.5 Management support systems are set/established to sustain and enhance the program 7.6 Environmental incidents are monitored and reported to concerned/proper authorities
8. Analyze resource use	8.1. All resource consuming processes are Identified 8.2. Quantity and nature of Resource consumed is determined 8.3. Resource flow is analyzed through different parts of the process. 8.4. Wastes are classified for possible source of resources.
9. Develop resource Conservation plans	9.1. Efficiency of use/conversion of resources is determined following industry protocol. 9.2. Causes of low efficiency of use of resources are Determined based on industry protocol. 9.3. Plans for increasing the efficiency of resource use are developed based on findings.

RANGE

This section provides work environments and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

Variable	Range
PPE May include but are not limited to	1.1 Mask 1.2 Gloves 1.3 Goggles 1.4 Safety hat 1.5 Overall 1.6 Hearing protector
Environmental pollution control measures may include but are not limited to:	2.1 Methods for minimizing or stopping spread and ingestion of airborne particles 2.2 Methods for minimizing or stopping spread and ingestion of gases and fumes 2.4 Methods for minimizing or stopping spread and ingestion of liquid wastes
Wastes may include but are not limited to:	3.1 Unnecessary waste 3.2 Necessary waste
Waste management Procedures may include but are not limited to:	4.1 Sorting 4.2 Storing of items 4.2 Recycling of items 4.3 Disposal of items
Resources may include but are not limited to:	5.1 Electric 5.2 Water 5.3 Fuel 5.4 Telecommunications 5.5 Supplies 5.6 Materials
Workplace environmental hazards may include but are not limited to:	6.1 Biological hazards 6.2 Chemical and dust hazards 6.3 Physical hazards
Organizational systems and procedures may include but are not limited to:	7.1 Supply chain, procurement and purchasing 7.2 Quality assurance 7.3 Making recommendations and seeking approvals
Legislations/Conventions may include but are not limited to:	8.1 EMCA 1999 8.2 Montreal Protocol 8.3 Kyoto Protocol

<i>Environmental aspects/impacts</i> may include but are not limited to:	9.1 Air pollution 9.2 Water pollution 9.3 Noise pollution 9.4 Solid waste 9.5 Flood control 9.6 Deforestation/Denudation 9.7 Radiation/Nuclear /Radio Frequency/ Microwaves 9.8 Situation 9.9 Soil erosion (e.g. Quarrying, Mining, etc.) 9.10 Coral reef/marine life protection
<i>Industrial standards / Environmental practices</i> may include but are not limited to:	10.1 ISO standards 10.2 Company environmental management systems (EMS)
<i>Periodic</i> may include but are not limited to:	11.1 hourly 11.2 daily 11.3 weekly 11.4 monthly 11.5 quarterly 11.6 yearly
<i>Programs/Activities</i> may include but are not limited to:	12.1 Waste disposal (on-site and off-site) 12.2 Repair and maintenance of equipment 12.3 Treatment and disposal operations 12.4 Clean-up activities 12.5 Laboratory and analytical test 12.6 Monitoring and evaluation 12.7 Environmental advocacy programs

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit of competency.

Required Skills

The individual needs to demonstrate the following skills:

- Following storage methods of environmentally hazardous materials
- Following disposal methods of hazardous wastes
- Using PPE
- Practicing OSHS
- Complying environmental pollution control
- Observing solid waste management
- Complying methods of minimizing noise Pollution
- Complying methods of minimizing wastage
- Employing waste management procedures
- Economizing resource consumption
- Listing of resources used

- Measuring current usage of resources
- Identifying and reporting workplace environmental hazards
- Conveying all environmental issues
- Following environmental regulations
- Identifying environmental regulations
- Assessing procedures for assessing compliance
- Collecting information on environmental and resource efficiency systems and procedures, and Providing information to the work group
- Measuring and recording current resource usage
- Analysing and recording current purchasing strategies.
- Analysing current work processes to access information and data and Assisting identifying areas for improvement
- Analysing resource flow
- Determining efficiency of use/conversion of resources
- Determining causes of low efficiency of use
- Developing plans for increasing the efficiency of resource use
- Checking resource use plans
- Complying to regulations/licensing requirements
- Determining benefit/cost of plans
- Ranking proposals based on benefit/cost compared to limited resources
- Checking proposals meet regulatory requirements
- Monitoring implementation
- Making adjustments to plan and implementation
- checking new resource usage

Required Knowledge

The individual needs to demonstrate knowledge of:

- Storage methods of environmentally hazardous materials
- Disposal methods of hazardous wastes
- Usage of PPE Environmental regulations
- OSHS
- Types of pollution
- Environmental pollution control measures
- Different solid wastes
- Solid waste management
- Different noise pollution
- Methods of minimizing noise pollution
- Methods of minimizing waste
- Waste management procedures
- Economizing of resource consumption
- Principle of 3Rs
- Types of resources

- Techniques in measuring current usage of resources
- Calculating current usage of resources
- Types of workplace environmental hazards
- Environmental regulations
- Environmental regulations applying to the enterprise.
- Procedures for assessing compliance with environmental regulations.
- 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 current work processes to access information and data Analysis of data and information
- Identification of areas for improvement
- Resource consuming processes
- Determination of quantity and nature of resource consumed
- Analysis of resource flow of different parts of the resource flow process
- Use/conversion of resources
- Causes of low efficiency of use
- Increasing the efficiency of resource use
- Inspection of resource use plans
- Regulations/licensing requirements
- Determine benefit/cost for alternative resource sources
- Benefit/costs for different alternatives
- Components of proposals
- Criteria on ranking proposals
- Regulatory requirements
- Proposals for improving resource efficiency
- Implementation of resource efficiency plans
- Procedures in monitor implementation
- Adjustments of implementation plan
- Inspection of new resource usage

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

1. Critical Aspects of Competency	Assessment requires evidence that the candidate: 1.1 Controlled environmental hazard 1.2 Controlled environmental pollution 1.3 Demonstrated sustainable resource use
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	1.4 Evaluated current practices in relation to resource usage 1.5 Demonstrated knowledge of environmental legislations and local ordinances according to the different environmental issues /concerns. 1.6 Described industrial standard environmental practices according to the different environmental issues/concerns. 1.7 Resolved problems/ constraints encountered based on management standard procedures 1.8 Implemented and monitored environmental practices on a periodic basis as per company guidelines 1.9 Recommended solutions for the improvement of the program 1.10 Monitored and reported to proper authorities any environmental incidents
2. Resource Implications	The following resources should be provided: 2.1 Workplace with storage facilities 2.2 Tools, materials and equipment relevant to the tasks (e.g. Cleaning tools, cleaning materials, trash bags) 2.3 PPE, manuals and references 2.4 Legislation, policies, procedures, protocols and local ordinances relating to environmental protection 2.5 Case studies/scenarios relating to environmental Protection
3 Methods of Assessment	Competency in this unit may be assessed through: 3.1 Demonstration 3.2 Oral questioning 3.3 Written examination 3.4 Interview/Third Party Reports 3.5 Portfolio (citations/awards from GOs and NGOs, certificate of training – local and abroad) 3.6 Simulations and role-play
4 Context of Assessment	Competency may be assessed on the job, off the job or a combination of these. Off the job assessment must be undertaken in a closely simulated workplace environment.
5 Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.

DEMONSTRATE OCCUPATIONAL SAFETY AND HEALTH PRACTICES

UNIT CODE: IT/OS/ICT/BC/07/6/A

UNIT DESCRIPTION

This unit specifies the competencies required to lead the implementation of workplace's safety and health program, procedures and policies/guidelines.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT	PERFORMANCE CRITERIA
These describe the key outcomes which make up workplace function.	These are assessable statements which specify the required level of performance for each of the elements. <i>Bold and italicized terms are elaborated in the Range</i>
1. Identify workplace hazards and risk	1.1 <i>Hazards</i> in the workplace and/or its <i>indicators</i> of its presence, are identified 1.2 <i>Evaluation and/or work environment</i> measurements of OSH hazards/risk existing in the workplace is conducted by Authorized personnel or agency 1.3 <i>OSH issues and/or concerns</i> raised by workers are Gathered
2. Identify and implement appropriate control measures	2.1 Prevention <i>and control measures</i> , including use of <i>safety gears / PPE (personal protective equipment)</i> for specific hazards identified and implemented 2.2 <i>Appropriate risk controls</i> based on result of OSH hazard evaluation is recommended. 2.3 <i>Contingency measures</i> , including <i>emergency procedures</i> during workplace <i>incidents and emergencies</i> are recognized and established in accordance with organization procedures.
3. Implement OSH programs, procedures and policies/ guidelines	3.1 Information to work team about company OSH program, procedures and policies/guidelines are provided 3.2 Implementation of OSH procedures and policies/ guidelines are participated 3.3 Team members are trained and advised on OSH standards and procedures 3.4 Procedures for maintaining <i>OSH-related records</i> are implemented

RANGE

This section provides work environments and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

Variable	Range
1. Hazards may include but are not limited to:	1.1. Physical hazards – impact, illumination, pressure, noise, vibration, extreme temperature, radiation 1.2 Biological hazards- bacteria, viruses, plants, parasites, mites, molds, fungi, insects 1.3 Chemical hazards – dusts, fibers, mists, fumes, smoke, gasses, vapors 1.4 Ergonomics Psychological factors – over exertion/ excessive force, awkward/static positions, fatigue, direct pressure, varying metabolic cycles Physiological factors – monotony, personal relationship, work out cycle 1.6 Safety hazards (unsafe workplace condition) – confined space, excavations, falling objects, gas leaks, electrical, poor storage of materials and waste, spillage, waste and debris 1.7 Unsafe workers’ act (Smoking in off-limited areas, Substance and alcohol abuse at work)
2. Indicators may include but are not limited to:	2.1 Increased of incidents of accidents, injuries 2.2 Increased occurrence of sickness or health complaints/symptoms 2.3 Common complaints of workers related to OSH 2.4 High absenteeism for work-related reasons
3. Evaluation and/or work environment measurements may include but are not limited to:	3.1 Health Audit 3.2 Safety Audit 3.3 Work Safety and Health Evaluation 3.4 Work Environment Measurements of Physical and Chemical Hazards
4. OSH issues and/or concerns may include but are not limited to:	4.1 Workers’ experience/observance on presence of work hazards 4.2 Unsafe/unhealthy administrative arrangements (prolonged work hours, no break time, constant overtime, scheduling of tasks) 4.3 Reasons for compliance/non-compliance to use of PPEs or other OSH procedures/policies/guidelines

5. <i>Prevention and control measures</i> may include but are not limited to:	5.1 Eliminate the hazard (i.e., get rid of the dangerous machine) 5.2 Isolate the hazard (i.e. keep the machine in a closed room and operate it remotely; barricade an unsafe area off) 5.3 Substitute the hazard with a safer alternative (i.e., replace the machine with a safer one) 5.4 Use administrative controls to reduce the risk (i.e. give trainings on how to use equipment safely; OSH-related topics, issue warning signages, rotation/shifting work schedule) 5.5 Use engineering controls to reduce the risk (i.e. use safety guards to machine) 5.6 Use personal protective equipment 5.7 Safety, Health and Work Environment Evaluation 5.8 Periodic and/or special medical examinations of workers
6. <i>Safety gears /PPE (Personal Protective Equipments)</i> may include but are not limited to:	6.1 Arm/Hand guard, gloves 6.2 Eye protection (goggles, shield) 6.3 Hearing protection (ear muffs, ear plugs) 6.4 Hair Net/cap/bonnet 6.5 Hard hat 6.6 Face protection (mask, shield) 6.7 Apron/Gown/coverall/jump suit 6.8 Anti-static suits 6.9 High-visibility reflective vest
7. <i>Appropriate risk controls</i>	Appropriate risk controls in order of impact are as follows: 7.1 Eliminate the hazard altogether (i.e., get rid of the dangerous machine) 7.2 Isolate the hazard from anyone who could be harmed (i.e., keep the machine in a closed room and operate it remotely; barricade an unsafe area off) 7.3 Substitute the hazard with a safer alternative (i.e., replace the machine with a safer one) 7.4 Use administrative controls to reduce the risk (i.e., train workers how to use equipment safely; train workers about the risks of harassment; issue signage) 7.5 Use engineering controls to reduce the risk (i.e., attach guards to the machine to protect users) 7.6 Use personal protective equipment (i.e., wear gloves and goggles when using the machine)
8. <i>Contingency measures</i> may include but are not limited to:	8.1 Evacuation 8.2 Isolation 8.3 Decontamination 8.4 (Calling designed) emergency personnel

9. Emergency procedures may include but are not limited to:	9.1 Fire drill 9.2 Earthquake drill 9.3 Basic life support/CPR 9.4 First aid 9.5 Spillage control 9.6 Decontamination of chemical and toxic 9.7 Disaster preparedness/management 9.8 se of fire-extinguisher
10. Incidents and emergencies may include but are not limited to:	10.1 Chemical spills 10.2 Equipment/vehicle accidents 10.3 Explosion 10.4 Fire 10.5 Gas leak 10.6 Injury to personnel 10.7 Structural collapse 10.8 Toxic and/or flammable vapors emission.
11. OSH-related Records may include but are not limited to:	11.1 Medical/Health records 11.2 Incident/accident reports 11.3 Sickness notifications/sick leave application 11.4 OSH-related trainings obtained

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit of competency.

Required Skills

The individual needs to demonstrate the following skills:

- Skills on preliminary identification of workplace hazards/risks
- Knowledge management
- Critical thinking skills
- Observation skills
- Coordinating skills
- Communication skills
- Interpersonal skills
- Troubleshooting skills
- Presentation skills
- Training skills

Required Knowledge

The individual needs to demonstrate knowledge of:

- General OSH Principles
- Occupational hazards/risks recognition
- OSH organizations providing services on OSH evaluation and/or work environment measurements (WEM)

- National OSH regulations; company OSH policies and protocols
- Systematic gathering of OSH issues and concerns
- General OSH principles
- National OSH regulations
- Company OSH and recording protocols, procedures and policies/guidelines
- Training and/or counseling methodologies and strategies

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

1. Critical Aspects of Competency	Assessment requires evidence that the candidate: 1.1 Identifies hazards/risks in the workplace and/or its indicators 1.2 Requests for evaluation and/or work environment measurements of OSH hazards/risk in the workplace 1.3 Gathers OSH issues and/or concerns raised by workers 1.4 Identifies and implements prevention and control measures, including use of PPE (personal protective equipment) for specific hazards 1.5 Recommends appropriate risk controls based on result of OSH hazard evaluation and OSH issues gathered 1.6 Establish contingency measures, including emergency procedures in accordance with organization procedures 1.7 Provides information to work team about company OSH program, procedures and policies/guidelines 1.8 Participates in the implementation of OSH procedures and policies/guidelines 1.9 Trains and advises team members on OSH standards and procedures 1.10 Implements procedures for maintaining OSH-related records
2. Resource Implications	The following resources should be provided: 2.1 Workplace or assessment location 2.2 OSH personal records 2.3 PPE 2.4 Health records
3. Methods of Assessment	Competency may be assessed through: 3.1 Portfolio Assessment 3.2 Interview 3.3 Case Study/Situation 3.4 Observation/Demonstration and oral questioning
4. Context of Assessment	Competency may be assessed on the job, off the job or a combination of these. Off the job assessment must be undertaken in a closely simulated workplace environment.

5. Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.
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COMMON UNIT OF COMPETENCY

APPLY BASIC ELECTRONIC

UNIT CODE:IT/OS/ICT/CC/01

Relationship to Occupational Standards

This unit addresses the unit of competency: Demonstration of basic electronic skills

Duration of Unit:

Unit description

This unit specifies the competencies required to demonstrate basic skills of electronics. It involves identification of electric circuits, electronic components, understand semi-conductor theory, identify and classify memories, apply number systems and identify emerging trends in electronics.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT	PERFORMANCE CRITERIA (<i>Bold and italicised terms are elaborated in the Range</i>)
1. Identify electrical circuits	1.1 Electrical circuit are identified 1.2 <i>Electrical quantities and their units</i> are identified 1.3 <i>Types of electrical circuits</i> are identified
2. Identify Electronic components	2.1 Identification of electrical components is done 2.2 Characteristic of electronic components are identified 2.3 Application of electronic components are Identified 2.4 Characteristics of integrated circuit are identified
3. Understand Semi-conductor theory	3.1 Explanation of semiconductor theory is done 3.2 Structure of matter is described 3.3 Electrons in conductors and semiconductors are explained 3.4 Types of semiconductor materials are identified 3.5 P-type and N-type materials are explained 3.6 Description of P-N junction diodes operations is done 3.7 <i>Types and operations of transistors</i> are identified
4. Identify and classify memory	4.1 <i>Types of memories</i> are identified 4.2 Memory hierarchy is identified 4.3 <i>Levels of memory storage</i> are identified 4.3 <i>Classification of memories</i> is done
5. Apply Number Systems and binary coding	5.1 <i>Types of number systems</i> are identified 5.2 Base conversion is done 5.3 Binary arithmetic operations are done 5.4 <i>Binary codes</i> are identified 5.5 Representation of decimals in BCD is done

	5.6 BCD arithmetic are performed
6. Emerging trends in Electronics	1.1 Description of emerging trends is done 1.2 Challenges of emerging trends are explained 1.3 Explanation on coping with the emerging trends is done

RANGE

This section provides work environments and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

Variable	Range <i>May include but is not limited to:</i>
1. Electrical quantities and their units	1.1 E.M.F in volts 1.2 Power in watts 1.3 Energy in joules 1.4 Resistance in ohms 1.5 Current in amperes
2. Types of electrical circuits	2.1 AC – Alternating Current 2.2 DC – Direct Current
3. Types and operations of transistors	3.1 Types ✓PNP ✓NPN 3.2 Operations ✓Forward biasing ✓Reverse Biasing
4. Types of memories	4.1 Semi-conductor 4.2 Magnetic 4.3 optical
5. Classification of memories	5.1 RAM 5.2 ROM
6. Levels of memory storage	6.1 Internal 6.2 Main 6.3 Online 6.4 Offline bulk
7. Types of number systems	7.1 Decimal 7.2 Binary 7.3 Octal 7.4 Hexadecimal 7.5 Binary Arithmetic's
8. Binary codes	8.1 8421 BCD 8.2 Excess 3 8.3 BCD arithmetic's

REQUIRED KNOWLEDGE AND UNDERSTANDING

The individual needs to demonstrate knowledge and understanding of:

1. Electrical Components
2. Electrical Quantities and units of measurement
3. Electrical circuits
4. Semiconductor theory
5. Number systems
6. Types of Computer memories

FOUNDATION SKILLS

The individual needs to demonstrate the following foundation skills:

1. Communications (verbal and written);
2. Proficient in ICT
3. Time management
4. Problem solving
5. Decision making
6. First aid

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required knowledge and understanding and range.

1. Critical Aspects of Competency	Assessment requires evidence that the candidate: 1.1 Identified Electrical Components, quantities and their units of measurement 1.2 Constructed a simple circuit 1.3 Identified types of transistors and their operations 1.4 Categorized the memories according to their levels, types and hierarchy 1.5 Identified the number systems, binary codes and their operations.
2. Resource Implications	The following resources must be provided: Resources same as that of workplace are advised to be applied Including resistors, Transistors, soldering wire, soldering Iron, printed circuit board, ammeter, volt meter, connecting wires, wire stripper, pliers, wire cutter, screw driver, drill, clamps, vise

3. Methods of Assessment	Competency may be assessed through: 3.1 Observation 3.2 Oral questioning 3.3 Practical demonstration
4. Context of Assessment	Competency may be assessed individually in the actual workplace and simulated setting of the actual work place
5. Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.

CORE UNITS OF COMPETENCIES

PERFORM COMPUTER NETWORKING

UNIT CODE: IT/OS/ICT/CR/01/6

UNIT DESCRIPTION

This unit covers the competencies required to perform computer networking activities. It involves identifying network types and components, connecting network devices, configuring network components and workstations, networking testing, configuring Network types, perform Network security, monitoring and maintaining.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT	PERFORMANCE CRITERIA <i>(Bold and italicised terms are elaborated in the Range)</i>
1. Identify network type and components	1.1. Site survey is conducted to determine the user needs and establish network topology 1.2. Network components are identified according to the site survey 1.3. Network design is developed according to the site survey
2. Connect Network devices	2.1. Tools, materials and devices for network are identified according to the network type 2.2. Network connection is done according National and international communication standards 2.3. Strength and connectivity tests of cables and equipment is done as per the network type
3. Configure network devices	3.1. Network software is installed and configured according to user manuals. 3.2. IP addressing scheme, subnet masking and routing protocol configuration is done 3.3. Network segmentation is determined as per the Network design. 3.4. Network privileges are allocated according to the network configuration.

ELEMENT	PERFORMANCE CRITERIA (<i>Bold and italicised terms are elaborated in the Range</i>)
4. Perform Network testing	4.1. Network components are tested to determine the performance. 4.2. Testing of connectivity medium between components is done as per the manual instructions. 4.3. Network testing is done, and report generated.
5. Configure network types e.g. LAN, WAN	5.1. Network types are identified as per the Network design 5.2. Network types are configured as per the type of connection 5.3. Network testing of network types is done
6. Perform Network Security	6.1. Identification and implementation of network security policy is done as per the Organization ICT policy. 6.2. Network security measures are identified according to the threats defined. 6.3. Network security measures are enforced in line with the Network security policy .
7. Monitor Network connectivity and performance	7.1. Monitoring tools are identified 7.2. Deployment of monitoring tools is done as per the network connection type. 7.3. Network status is determined as per the monitoring report.
8. Maintain Network	8.1. Optimization between the network Components and medium is done 8.2. Network security is applied according to vulnerability of the Network. 8.3. Maintenance schedule is performed 8.4. User training is done according to the instruction manual.

RANGE

This section provides work environment and conditions to which the performance Criteria apply. It allows for different work environment and situations that will affect Performance.

Variable	Range <i>May include but is not limited to:</i>
1. Network components	1.6 Routers 1.7 Switches 1.8 Hub 1.9 RJ 45 cables 1.10 Ports 1.11 Computers 1.12 printers
2. Network topology	2.1 Star 2.2 Ring 2.3 Mesh 2.4 Hybrid 2.5 Point to point
3. Network security Measures	3.1 Intrusion detection systems 3.2 Patching and Updating 3.3 Port Scanners 3.4 Network Sniffers 3.5 Vulnerability scanners 3.6 Antiviruses
4. Network types	4.1 WAN 4.2 LAN 4.3 PAN
5. Monitoring tools	5.1 Ping 5.2 Tracert 5.3 NSLookup 5.4 Ipconfig 5.5 Speed test
6. Network security policy	6.1 document that outlines rules for computer network access, determines how policies are enforced and lays out some of the basic architecture of the company security/ network security environment
7. Network software	7.1 NetFlow 7.2 Active Directory 7.3 Zabbix

Variable	Range <i>May include but is not limited to:</i>
	7.4 Telnet 7.5 Wireshark
8. Network segmentation	8.1 splitting a computer network into subnetworks, each being a network segment to improve performance.
9. Network privileges	9.1 privilege allows a user to perform an action. Examples of various privileges include the ability to create a file in a directory, or to read or delete a file, access a device, or have read or write permission to a socket for communicating over the Internet

REQUIRED KNOWLEDGE AND UNDERSTANDING

The individual needs to demonstrate knowledge and understanding of:

1. Network Architecture
2. Network programming languages
3. Network Components and devices
4. Network types
5. Network security Measures
6. Network Monitoring procedures
7. Network testing techniques
8. Network configuration techniques
9. Network protocols
10. Network security techniques and procedures
11. Network testing procedures

FOUNDATION SKILLS

The individual needs to demonstrate the following foundation skills:

- Communications (verbal and written);
- Proficient in ICT;
- Troubleshooting
- Problem solving
- Decision Making

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required knowledge and understanding and range.

1. Critical Aspects of Competency	Assessment requires evidence that the candidate: 1.1 Identified network components during the site survey 1.2 Tested the Strength and connectivity of cables and equipment 1.3 Identified Network types as per the Network design 1.4 Installed and configured network software according to user manuals. 1.5 Implement the network security policy 1.6 Identified and implemented network security measures 1.7 Identified and deployed monitoring tools
2. Resource Implications	The following resources must be provided: Resources same as that of workplace are advised to be applied Including computers, media, routers, switches, ports etc
3. Methods of Assessment	Competency may be assessed through: 3.1 Observation 3.2 Oral questioning 3.3 Practical demonstration
4. Context of Assessment	Competency may be assessed individually in the actual workplace and simulated setting of the actual work place
5. Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.

INSTALL COMPUTER SOFTWARE

UNIT CODE: IT/OS/ICT/CR/2/6

UNIT DESCRIPTION

This unit covers the competencies required to perform computer software installation work. Installation activities includes identification of the software to be installed, actual installation of the software, Software configuration software functionality test, software maintenance and user training.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT	PERFORMANCE CRITERIA (<i>Bold and italicised terms are elaborated in the Range</i>)
1. Identification of software to be installed	1.1 Software are classified according to the functionality, resource requirement and use. 1.2 Criteria for selection of software is identified based on user requirements and functionality 1.3 Appropriate software acquisition methods are established as per the functionality.
2. Install the software	2.1 Software specifications and computer resource requirements are identified 2.2 Source of software installation files is determined 2.3 Existing data is backed up 2.4 User vendor agreements are identified according to the Installation manual. 2.5 Software installation is done as per the installation manual provided.
3. Configure the software	3.1 Software configuration is done as per the installation manual provided. 3.2 Required software parameters are set as per the software manual. 3.3 Software configuration is done as per the set parameters
4. Test software functionality	4.1 Software test is performed 4.2 Software functionality is determined according to the test performed

ELEMENT	PERFORMANCE CRITERIA (<i>Bold and italicised terms are elaborated in the Range</i>)
	4.3 Test report is generated 4.4 Corrective measures are taken based on the test report
5. Perform User training	5.1 Determine user skill set as per the Instructions manual 5.2 <i>User training manuals</i> are prepared according to software functionality 5.3 User training is conducted according to system functionality
6. Perform software maintenance	6.1 Software maintenance schedule is established 6.2 <i>Software upgrades and modules patches</i> are applied. 6.3 Software revisions are performed to correspond with functionality changes.

RANGE

This section provides work environment and conditions to which the performance Criteria apply. It allows for different work environment and situations that will affect Performance.

Variable	Range <i>May include but is not limited to:</i>
1. software acquisition methods	1.1 In – house developed 1.2 Tailor made 1.3 Outsourced
2. Software specifications	2.1 detailed description of a software system to be developed with its functional and non-functional requirements. Usually has the following characteristics: ✓ Complete. ✓ Consistent. ✓ Feasible. ✓ Modifiable. ✓ Unambiguous. ✓ Testable
3. software parameters	3.1 characteristic that can help in <i>defining</i> or classifying a software.
4. User training manuals	4.1 Documentation available for users to help them understand and properly use a certain product or service
5. Software upgrades and modules patches	5.1 update are programs that fix issues with the software and add more hardware support while patches add additional features to your software product.

REQUIRED KNOWLEDGE AND UNDERSTANDING

The individual needs to demonstrate knowledge and understanding of:

1. Operating systems
2. Types of operating systems
3. Software installation legal requirements
4. Types of software installation
5. Types of Software testing
6. Software installation techniques
7. Software Upgrading and Patching

- | |
|--|
| <ol style="list-style-type: none">8. Software Acquisition Methods9. Software Maintenance Procedures |
|--|

FOUNDATION SKILLS

The individual needs to demonstrate the following foundation skills:
• Communications (verbal and written); • Troubleshooting • Problem solving; • Decision making; • Planning; • Report writing;

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required knowledge and understanding and range.

1. Critical Aspects of Competency	Assessment requires evidence that the candidate: 1.1 Classified the software according to the functionality, resource requirement and use 1.2 Established software acquisition methods as per the functionality 1.3 Configured software as per the installation manual provided. 1.4 Performed software testing 1.5 Prepared user training manuals according to software functionality.
2. Resource Implications	2.1 Resources the same as that of workplace are advised to be applied. Including Device drivers, operating system, servers, utilities
3. Methods of Assessment	Competency may be assessed through: 3.1 Observation with the help of check list 3.2 Practical demonstrations 3.3 Oral Questioning
4. Context of Assessment	Competency may be assessed individually in the actual workplace or a simulated work place setting
5. Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.

CONTROL ICT SECURITY THREATS

UNIT CODE: IT/OS/ICT/CR/3/6

UNIT DESCRIPTION

This unit covers the competencies required to provide ICT security. They include identification of security threats, installation of security control measures, implementation of security measures, testing of system vulnerability and monitoring of the security system.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT	PERFORMANCE CRITERIA <i>(Bold and italicised terms are elaborated in the Range)</i>
1. Identify security threats	1.1 <i>Security threats</i> are identified based on the vulnerability of the system. 1.2 Security threats are categorised according to the risk impact 1.3 Appropriate Security measures are selected as per the Security threats
2. Establish and Install security control measures	2.1 ICT Security policy is implemented as per the <i>Kenya security act 2018</i> 2.2 <i>Security control measures</i> are identified and categorized as per the laws governing security in ICT. 2.3 Evaluation of Security control measures is done as per the ICT Security policy 2.4 Installation of Security control measures is done as per the ICT security policy
3. Deploy Security Measures	3.1 Physical control measures are implemented according to the ICT security policy. 3.2 Logical security control measures are implemented according to the ICT security policy. 3.3 <i>ICT Security policy</i> is implemented According to the Kenya security Act 2018.

ELEMENT	PERFORMANCE CRITERIA <i>(Bold and italicised terms are elaborated in the Range)</i>
4. Test system vulnerability	4.1 Schedule system testing plan is developed 4.2 Vulnerable levels of the system are identified. 4.3 Security <i>ethical penetration</i> is done as per the ICT security policy. 4.4 Report on system vulnerability is generated 4.5 Corrective action is taken based on the System Vulnerability report
5. Monitor security system	5.1 Performance of the security systems is evaluated. 5.2 Reports on security system are generated 5.3 Security systems are updated or overhauled based on the security system report.

RANGE

Variable	Range <i>May include but is not limited to:</i>
1. Security threats	1.1 Malicious hackers 1.2 Industrial espionage 1.3 Employee sabotage 1.4 Fraud and theft 1.5 Loss of physical and infrastructure support 1.6 Errors and Omissions
2. Security control measures	2.1 Preventive 2.2 Detective 2.3 Responsive
3. ICT Security policy	3.1 refers to a document that has a set of rules enacted by an organization to ensure that all users or networks of the IT structure within the organization's domain abide by the prescriptions regarding the security of data stored digitally within the boundaries the organization stretches its authority.
4. Ethical Penetration	4.1 refers to legally breaking into computers and devices to test an organization's defences.

REQUIRED KNOWLEDGE AND UNDERSTANDING

The individual needs to demonstrate knowledge and understanding of:

1. Security risk management techniques and procedures
2. Types of security threats and their control measures
3. Security audit procedures
4. ICT security policy
5. Strategies for Mitigating risks
6. Categories of Security threats
7. Penetration testing skills

FOUNDATION SKILLS

The individual needs to demonstrate the following foundation skills:

- | | |
|---|--|
| <ul style="list-style-type: none">• Communications (verbal and written);• Time management;• Penetration Skills• Problem solving;• Planning; | <ul style="list-style-type: none">• Decision making;• Report writing; |
|---|--|

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and understanding and range.

1. Critical Aspects of Competency	Assessment requires evidence that the candidate: 1.1 Identified and classified security threats 1.2 Identified and categorized security control measures 1.3 Implemented ICT security policy 1.4 Developed a schedule system testing plan
2. Resource Implications	Resources the same as that of workplace are advised to be applied including 2.1 Computers 2.2 Servers 2.3 Data centres 2.4 Security software
3. Methods of Assessment	Competency may be assessed through: 3.1 Observation 3.2 Oral questioning 3.3 Practical test in conducting test 3.4 Demonstration of interpretation of test results
4. Context of Assessment	Competency may be assessed individually 4.1 In the actual workplace 4.2 Simulated environment of the work place
5. Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.

PERFORM ICT SYSTEM SUPPORT

UNIT CODE: IT/OS/ICT/CR/4/6

UNIT DESCRIPTION

This unit covers the competencies required for performing ICT Infrastructure support. It involves identification and Documentation of ICT infrastructure equipment, Evaluation of the possible causes of failures of the components, diagnose and fix problems, test component performance and perform user training.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT	PERFORMANCE CRITERIA (<i>Bold and italicised terms are elaborated in the Range</i>)
1. Identify and Document ICT infrastructure equipment	1.1 Perform audit on existing <i>ICT Components and Infrastructure as</i> per the manufacturers manual 1.2 Perform ICT Components and Infrastructure documentation 1.3 Classification of ICT infrastructural components is done. 1.4 Specifications of ICT infrastructure is established based on manufacturer's manual 1.5 Tools for ICT infrastructural support are identified as per the audit report 1.6 <i>Safety and precautions measures</i> are identified as per the internal ICT policy 1.7 Maintain the ICT Infrastructure and components asset register to date
2. Evaluate the state of performance and possible causes of failures of the components	2.1 Perform troubleshooting of failed components 2.2 Determine Possible causes of failure 2.3 Carry out repair or replacement of failed components 2.4 Test the repaired or replaced component 2.5 Adopt component failure Prevention measures 2.6 Generate report
3. Diagnose and fix problems	3.1 Tools and equipment for diagnosing and fixing the problem are identified 3.2 <i>Troubleshooting</i> activities are carried out to establish causes of problems. 3.3 Problems identified are fixed as per the manufacturer guidelines.

ELEMENT	PERFORMANCE CRITERIA <i>(Bold and italicised terms are elaborated in the Range)</i>
	3.4 Generate a report
4. Test components performance	4.1 System is powered on and performance analysis is carried out 4.2 Recommendation from performance analysis is done. 4.3 Test performance report is generated
5. Perform User training	5.1 User training needs are identified 5.2 User skill set is determined based on the user training needs report 5.3 User training is conducted based on the user training needs report.

RANGE

This section provides work environment and conditions to which the performance Criteria apply. It allows for different work environment and situations that will affect Performance.

Variable	Range <i>May include but is not limited to:</i>
1. ICT components and infrastructure	1.1 Software 1.2 Hardware 1.3 People 1.4 Data 1.5 Procedures 1.6 Information
2. Safety and precautions measures	2.1 are activities and precautions taken to improve safety in a workplace
3. Troubleshooting	3.1 Refers to a systematic approach to problem solving that is often used to find and correct issues with machines, electronics, computers and software systems

REQUIRED KNOWLEDGE AND UNDERSTANDING

The individual needs to demonstrate knowledge and understanding of:

1. Troubleshooting techniques
2. ICT Infrastructure auditing procedures
3. ICT safety and precautions measures
4. ICT Prevention measures
5. Performance monitoring techniques
6. ICT policy
7. Causes of hardware and software failure
8. Components of ICT Infrastructure
9. User training procedures

FOUNDATION SKILLS

The individual needs to demonstrate the following additional skills:

- Communications (verbal and written);
- Proficient in ICT;
- Time management;
- Analytical
- Faults troubleshooting
- Problem solving;
- Planning;
- Decision making;
- Report writing;

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and understanding and range.

1. Critical Aspects of Competency	Assessment requires evidence that the candidate: 1.1 Performed audit on existing ICT Components and Infrastructure 1.2 Identified and used appropriate Tools for ICT infrastructural support 1.3 Performed Troubleshooting on the ICT infrastructure and components 1.4 Identified and applied Safety and precautions measures as per the internal ICT policy
2. Resource Implications	2.1 Resources the same as that of workplace are advised to be applied Included: computers, printers, servers, routers, switches, etc.
3. Methods of Assessment	Competency may be assessed through: 3.1 Oral questioning 3.2 Practical demonstration 3.3 Observation
4. Context of Assessment	4.1 Competency may be assessed individually in the actual workplace or through simulated work environment
5. Guidance information for assessment	5.1 Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.

PERFORM WEBSITE DESIGN

UNIT CODE: IT/OS/ICT/CR/5/6

UNIT DESCRIPTION

This unit covers the competencies required to perform Website Design. It Involves gathering data required, determining of website design tool, developing a dynamic functional website, host website developed, perform routine website maintenance.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT	PERFORMANCE CRITERIA (<i>Bold and italicised terms are elaborated in the Range</i>)
1. Gather data required	1.1 Website requirements are obtained and analysed as per website type to be developed 1.2 Website design is done based on the obtained requirements. 1.3 Website design is done as per the data gathered
2. Determine Website design tool	2.1 Identify and consider <i>Appropriate website authoring software suite</i> 2.2 Installation and configuration of adopted web authoring software or desired scripting language is done
3. Develop functional website	3.1 Development of web pages is done as per user requirements 3.2 Adding interactivity to the website is done as per the user requirements. 3.3 Website testing is done to check Interactivity of the website. 3.4 Linkage of website to the database is done based on the user requirements.
4. Host Website developed	4.1 Legal and regulatory requirements are determined based on the existing ICT laws. 4.2 Assigning of the <i>domain name</i> is done based on the existing laws. 4.3 Website security measures are implemented as per the existing ICT laws.

ELEMENT	PERFORMANCE CRITERIA <i>(Bold and italicised terms are elaborated in the Range)</i>
5. Perform Website Routine Maintenance	5.1 Links of the website are tested, and corrections are done 5.2 website pages are tested according to the user requirements and necessary changes are done 5.3 verification of output data is done to ensure it conforms to the user requirements 5.4 Website version is upgraded to meet the current standards 5.5 Continuous creation, update and archiving of content is done 5.6 Generate maintenance report as per the internal policy

RANGE

This section provides work environment and conditions to which the performance Criteria apply. It allows for different work environment and situations that will affect Performance.

Variable	Range <i>May include but is not limited to:</i>
1. Website requirements	1.1 Business Requirements define the objectives and what problems the stakeholder intends to solve with the product. 1.2 User Requirements describe how user expectations and how they will interact with the product. Use the features, functions, and content described in your scenarios to develop your requirements. Your user scenarios should outline the tasks your users want to complete on your site. 1.3 Functional Requirements provide details of how a product should behave and specify what is needed for development.
2. Appropriate website authoring software suite	2.1 refers to a web authoring package that is specifically designed to allow you to create web pages and web sites. Examples include Dreamweaver and Microsoft Front Page
3. domain name	3.1 an identification string that defines a realm of administrative autonomy, authority or control within the Internet. ✓ TLD - Top Level Domains ✓ ccTLD - country code Top Level Domains ✓ gTLD - generic Top-Level Domain. ✓ IDN ccTLD - internationalized country code top-level domains
4. Website security measures	4.1 Keep software up to date 4.2 Watch out for SQL injection. 4.3 Protect against XSS attacks. 4.4 Beware of error messages. 4.5 Check your passwords. 4.6 Avoid file uploads.

Variable	Range
	<i>May include but is not limited to:</i>
	4.7 Use HTTPS

REQUIRED KNOWLEDGE AND UNDERSTANDING

The individual needs to demonstrate knowledge and understanding of:

1. Web programming
2. Web programming languages
3. Web Authoring software suite
4. Web Authoring tools
5. Web Hosting procedures
6. Database Creation
7. Types of websites
8. Website testing techniques
9. Website security threats and measures
10. Legal requirements and laws during website hosting

FOUNDATION SKILLS

The individual needs to demonstrate the following foundation skills:

- Communications (verbal and written);
- Proficient in ICT;
- Problem solving
- Planning
- Report writing

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required knowledge and understanding and range.

1. Critical Aspects of Competency	Assessment requires evidence that the candidate: 1.1 Obtained and analysed website requirements 1.2 Designed Website based on the obtained requirements. 1.3 Identified the Appropriate website authoring software suite 1.4 Linked the website with the database 1.5 Implemented Website security measures 1.6 Performed website maintenance
2. Resource Implications	<i>The following resources must be provided:</i> 2.1 Resources the same as that of workplace are advised to be applied Including computer, software suite, hosting server etc
3. Methods of Assessment	Competency may be assessed through: 3.1 Oral test 3.2 Observation 3.3 Practical demonstration
4. Context of Assessment	Competency may be assessed individually in the actual workplace or through a simulated work place setting
5. Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.

PERFORM COMPUTER REPAIR AND MAINTENANCE

UNIT CODE: IT/OS/ICT/CR/6/6

UNIT DESCRIPTION

This unit covers the competencies required for performing computer repair and maintenance using diagnosing, repairing and maintenance tools. It involves performing troubleshooting, disassembling of faulty components, repairing/replacing faulty components, testing of component functionality upgradation and testing of hardware and software.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT	PERFORMANCE CRITERIA <i>(Bold and italicised terms are elaborated in the Range)</i>
1. Perform component troubleshooting	1.1 Identification of computer parts is done as per the manufacturer's manual 1.2 Assembling of appropriate computer maintenance tools and maintenance techniques is done as per the manufacturer's manual 1.3 Theory of probable cause is established 1.4 Testing of the theory to determine cause is done 1.5 Identification of the problem is established 1.6 Appropriate solution to the problem is performed
2. Disassemble faulty components	2.1 Tools for disassembling are assembled as per the disassembling procedures 2.2 Faulty components are disassembled 2.3 Disassembling is performed according to provided instruction manuals.
3. Repair/replace and reassemble components	3.1 Faulty parts to be repaired or replaced are identified 3.2 Acquisition of new parts is done as per the specifications of the components in the case of replacement and repair is done on faulty components. 3.3 Reassembling of the repaired or replaced components is done
4. Test computer/component functionality	4.1 Switch on the computer for POST test 4.2 Perform specific component test as per the

ELEMENT	PERFORMANCE CRITERIA (<i>Bold and italicised terms are elaborated in the Range</i>)
	manufacturer manual 4.3 Evaluation of the test results is done 4.4 Generation of the component and system report is done 4.5 Develop a component test plan based on the component report
5. Upgrade computer software/hardware	5.1 Run <i>diagnostic program</i> according to the manufacturer's manual 5.2 Install update if any according to the manufacturer manual

RANGE

This section provides work environment and conditions to which the performance Criteria apply. It allows for different work environment and situations that will affect Performance.

Variable	Range <i>May include but is not limited to:</i>
1. Appropriate computer maintenance tools	1.1 Straight-head screwdriver 1.2 Phillips-head screwdriver 1.3 Tweezers or part retriever. 1.4 Needle-nosed pliers. 1.5 Wire cutters. 1.6 Chip extractor. 1.7 Hex wrench set. 1.7 Torx screwdriver
2. Instruction manuals.	2.1 Refers to an instructional book or booklet that is supplied with almost all technologically advanced consumer product to be used during inspection
3. POST test	3.1 process performed by firmware or software routines immediately after a computer or other digital electronic device is powered on.
4. Diagnostic program	4.1 Software tool used to diagnose problems with a particular set of hardware devices.

REQUIRED KNOWLEDGE AND UNDERSTANDING

The individual needs to demonstrate knowledge and understanding of:

1. Troubleshooting techniques
2. Procedures and techniques for reassembling and assembling
3. Component testing techniques
4. Computer systems and their components
5. The manufacturer's warranty requirements relating to commissioning activities for the computer and related components.
6. The legal requirements relating to commissioning activities for computer systems and components.
7. procedures and techniques for upgrading

FOUNDATION SKILLS

The individual needs to demonstrate the following additional skills:

- Communications (verbal and written);
- Proficient in ICT;
- Time management;
- Analytical
- Faults troubleshooting
- Problem solving;
- Planning;
- Decision making;
- Report writing;

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and understanding and range.

6. Critical Aspects of Competency	Assessment requires evidence that the candidate: 1. Performed Component Troubleshooting 2. Assembled appropriate computer maintenance tools 3. Identified different maintenance techniques 4. Identified and disassembled Faulty components 5. Performed specific component test
7. Resource Implications	Resources the same as that of workplace are advised to be applied Including computer, printers, photocopiers, keyboards etc
8. Methods of Assessment	Competency may be assessed through: 8.1 Oral questioning 8.2 Practical demonstration 8.3 Observation
9. Context of Assessment	9.1 Competency may be assessed individually in the actual workplace or through simulated work environment
10. Guidance information for assessment	10.1 Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.

MANAGE DATABASE SYSTEMS

UNIT CODE: IT/OS/ICT/CR/7/6

UNIT DESCRIPTION

This unit covers the competencies required to carry out management of databases systems. It involves identification of database management systems, designing of database, Creation and manipulation of database, database testing e.g. using dummy data, implementation of the designed database, establishing transaction and concurrency mechanism and managing database security.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT	PERFORMANCE CRITERIA (<i>Bold and italicised terms are elaborated in the Range</i>)
1. Identify database management system	1.1 Database requirements are established based on user needs. 1.2 Main features in databases are identified according to expected output. 1.3 database components are identified 1.4 Classification and categories of databases is done 1.5 Functionality of databases is identified as per the requirements 1.6 Suitable database system is adopted as per user requirements
2. Design database system	2.1 Appropriate database structures are determined 2.2 Database design is implemented based on requirements. 2.3 Database modelling is done as per the design implemented 2.4 Database operations are performed
3. Create and manipulate database	3.1 Appropriate data Attributes are applied appropriately 3.2 Data relationships are established as per the tables created 3.3 Model and index of the data is done. 3.4 Data is extracted from database using SQL

ELEMENT	PERFORMANCE CRITERIA (<i>Bold and italicised terms are elaborated in the Range</i>)
4. Perform database testing	4.1 Test data is prepared according to the database design 4.2 Run the test data based on the expected output 4.3 Check the test results based on the clients needs 4.4 Validate the results 4.5 Report the findings
5. Implement designed database	5.1 Scope is defined as per the design 5.2 Organize database project according to time frame 5.3 Select database management system products 5.4 Develop initial implementation plan and schedule 5.5 Design the database 5.6 Install and test database 5.7 Develop detailed conversion plan 5.8 Convert existing applications 5.9 Fine tune the database 5.10 Perform training 5.11 Periodically review database performance
6. Establish transaction and concurrency mechanism	6.1 <i>Transaction mechanisms</i> used in database management system are identified 6.2 Management of multiple transactions in database management system are identified
7. Manage database security	7.1 Restriction of access to the database is established 7.2 Backup and recovery methods are identified and implemented.

RANGE

This section provides work environment and conditions to which the performance Criteria apply. It allows for different work environment and situations that will affect Performance.

Variable	Range <i>May include but is not limited to:</i>
1. Database components	1.1 Software 1.2 Hardware 1.3 Data 1.4 Procedures 1.5 Database Access Language 1.6 Query Processor 1.7 Run Time Database Manager 1.8 Data Manager 1.9 Database Engine 1.10 Data Dictionary 1.11 Report Writer
2. Database structures	2.1 Refers to a collection of record type and field type definitions that comprise your database: ❑ Record Types. These define the type of entities or research objects you wish to capture (e.g. Person). ❑ Fields. These are the properties or attributes that describe your record types (e.g. Gender, Age, Height etc.)
3. Database operations	3.1 INSERT 3.2 SELECT 3.3 UPDATE 3.4 DELETE
4. data Attributes	4.1 Atomic Attribute 4.2 Composite Attribute 4.3 Single Valued Attribute 4.4 Multi Valued Attribute 4.5 Stored Attribute 4.6 Derived Attribute 4.7 Null Valued Attribute

Variable	Range <i>May include but is not limited to:</i>
5. Transaction mechanisms	5.1 Refers to a logical unit that is independently executed for data retrieval or updates. In relational databases, database transactions must be atomic, consistent, isolated and durable

REQUIRED KNOWLEDGE AND UNDERSTANDING

The individual needs to demonstrate knowledge and understanding of:

1. Database management system types
2. Database manipulation and creation
3. Types of database testing
4. Database testing techniques
5. Database structures and operations
6. Data Models, Attributes and relationships
7. Transactions and concurrency mechanisms
8. Database design and implementation methods
9. Database security features

FOUNDATION SKILLS

The individual needs to demonstrate the following foundation skills:

- Communications (verbal and written);
- Proficient in ICT;
- Time management;
- Analytical
- Problem solving;
- Planning;
- Decision making;
- Report writing;

EVIDENCE GUIDE

This provides advice on assessment and must be in conjunction with the performance criteria, required knowledge and understanding and range.

1. Critical Aspects of Competency	Assessment requires evidence that the candidate: 1.1 Established Database requirements 1.2 Identified database components 1.3 Adopted a Suitable database system 1.4 Performed Database operations 1.5 Applied Appropriate Data Attributes 1.6 Extracted data from database using SQL 1.7 Performed test data and validated the results 1.8 Identified transaction and concurrency mechanisms 1.9 Established restrictions to the database
2. Resource Implications	<i>The following resources must be provided:</i> 2.1 Computer 2.2 Servers 2.3 Database Software
3. Methods of Assessment	Competency may be assessed through: 3.1 Oral questioning 3.2 Practical demonstration 3.3 Observation
4. Context of Assessment	Competency may be assessed individually in the actual workplace or through a simulated work place environment
5. Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.

MANAGE INFORMATION SYSTEM

UNIT CODE: IT/OS/ICT/CR/8/6

UNIT DESCRIPTION

This unit covers the competencies required to manage information system. It involves identification of information system concepts, classification of information systems, management of information resources, Planning of information system, identification of impact of information system in an organization

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT	PERFORMANCE CRITERIA <i>(Bold and italicised terms are elaborated in the Range)</i>
1. Identify information system concepts	1.1 Definition of MIS and its terms is done 1.2 Components of an IS are identified based on the type of Information System. 1.3 Roles of an IS are identified 1.4 Qualities of an Information System are identified 1.5 Types of Information Systems are identified
2. Classify information systems	2.1 Strategic levels of an Organization are identified 2.2 Classification of Information systems is done 2.3 Information System processing requirements is done 2.4 Functional areas of MIS are identified
3. Manage information resources	3.1 Information resource management concepts are identified 3.2 IS resources are determined 3.3 Classification of IS Resources is done. 3.4 Importance of managing information resources is identified
4. Plan Information system	4.1 Definition of IS planning is done

ELEMENT	PERFORMANCE CRITERIA <i>(Bold and italicised terms are elaborated in the Range)</i>
	4.2 Importance of planning is identified 4.3 IS planning process is done 4.4 IS planning techniques are identified 4.5 Project planning is done 4.6 IS <i>Acquisition methods</i> are identified
5. Identify impact of information system in organization	5.1 Trends of IS Aare identified 5.2 Organizational change in management is done 5.3 IS maintenance is done 5.4 <i>Ethical issues</i> in IS are identified 5.5 legal issues in IS are identified

RANGE

This section provides work environment and conditions to which the performance Criteria apply. It allows for different work environment and situations that will affect Performance.

Variable	Range <i>May include but is not limited to:</i>
1. Components	1.1 Hardware 1.2 Software 1.3 Telecommunications 1.4 Databases and Data Warehouses 1.5 Human Resources and Procedures
2. Qualities	2.1 Relevance. 2.2 Accuracy. 2.3 Usefulness. 2.4 Timeliness. 2.5 Completeness.
3. Strategic levels	3.1 Operational level 3.2 Knowledge level

Variable	Range <i>May include but is not limited to:</i>
	3.3 Tactical level 3.4 Strategic level
4. Acquisition methods	4.1 Outsourcing 4.2 Open source 4.3 Commercial off the shelf
5. Ethical issue	Refers to situation that requires a person or organization to choose between alternatives that must be evaluated as right (ethical) or wrong (unethical)

REQUIRED KNOWLEDGE AND UNDERSTANDING

The individual needs to demonstrate knowledge and understanding of:

1. MIS components
2. Types of information systems
3. Roles of an Information system
4. Classification of information systems
5. Information system requirements
6. Functional areas of management information systems
7. Information system resources
8. Information system acquisition methods

FOUNDATION SKILLS

The individual needs to demonstrate the following foundation skills:

- Communications (verbal and written);
- Proficient in ICT;
- Time management;
- Analytical
- Problem solving;
- Planning;
- Decision making;
- Report writing;

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required knowledge and understanding and range.

1. Critical Aspects of Competency	Assessment requires evidence that the candidate: 2. Identified Components of an IS 3. Identified Types of Information Systems 4. Identified Strategic levels of an Organization 5. Identified Functional areas of an MIS 6. Classified IS Resources 7. Identified IS planning techniques 8. Identified IS <i>Acquisition methods</i>
2. Resource Implications	<i>The following resources must be provided:</i> 2.1 Resources the same as that of workplace are advised to be applied Networks, Hardware, Software, Data and People
3. Methods of Assessment	Competency may be assessed through: 3.1 Oral test 3.2 Observation 3.3 Practical demonstration
4. Context of Assessment	4.1 Competency may be assessed individually in the actual workplace or through a simulated work place setting
5. Guidance information for assessment	5.1 Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.

PERFORM GRAPHIC DESIGN

UNIT CODE: IT/OS/ICT/CR/9/6

UNIT DESCRIPTION

This unit covers the competencies required to Perform Graphic Design. It involves Identification of graphic design concepts, identification of elements and principles of graphic design, application of typography techniques, creation and editing of images, perform of layout design and printing of the layout design.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT	PERFORMANCE CRITERIA <i>(Bold and italicised terms are elaborated in the Range)</i>
1. Identify Graphic Design Concepts	1.1 Definition of Graphic Design and terms is done 1.2 Graphic <i>design equipment</i> is identified based on the design. 1.3 Applications areas of Graphic design are identified. Benefits of Graphic Design are identified
2. Identify Elements and principles of Graphic Design	2.1 Elements of graphic design are defined 2.2 Types of <i>Graphic design elements</i> are Identified 2.3 <i>Graphic Design Principles</i> are identified as per the design 2.4 Identification of Graphic design principles Techniques is done 2.5 Importance of graphic design principles are identified
3. Apply Typography Techniques	3.1 Definition of Typography is done 3.2 Identification and application of anatomy is done. 3.3 Types of Typographies are identified 3.4 Identification of measurements and standards of typography is done 3.5 Typography guidelines are identified

ELEMENT	PERFORMANCE CRITERIA (<i>Bold and italicised terms are elaborated in the Range</i>)
4. Create and Edit Images	4.1 Software and tools for Graphic Design and photography are identified 4.2 Identification of <i>image file types</i> is done. 4.3 Creation of letterforms, lines of type and body copy, using appropriate software is done, 4.4 Creation and manipulation of images using appropriate software is done.
5. Perform Layout Design	5.1 Understanding of proportion and its application in layout design is done 5.2 Creation of unified systems out of dissimilar elements is done. 5.3 Manipulation of <i>typographic tools</i> to create dynamic layout is done. 5.4 Development of a type and image project is done. 5.5 Introduction to multi-page layout planning, in design is done. 5.6 Development of advanced typographic layout is done. 5.7 Development of a multi-page magazine layout is done.
6. Print Design created	6.1.Tools and Equipment for printing are identified. 6.2. <i>Types of printing</i> are identified based on the design. 6.3.Classification of Paper according to its types, sizes and paper weight is done. 6.4.Identification of the chemicals used in Printing is done. 6.5.Printing of the actual design is done

RANGE

This section provides work environment and conditions to which the performance Criteria apply. It allows for different work environment and situations that will affect Performance.

Variable	Range <i>May include but is not limited to:</i>
1. Graphic design equipment	1.1 Computer 1.2 Scanner 1.3 Printer 1.4 Camera 1.5 Digital Tablet
2. Graphic design elements	2.1 Color 2.2 Line 2.3 Shape 2.4 Space 2.5 Texture 2.6 Value
3. Graphic Design Principles	3.1 Balance 3.2 Contrast 3.3 Emphasis 3.4 Harmony 3.5 Proportion 3.6 Pattern 3.7 Unity 3.8 Variety
4. Image file types	4.1 Raster 4.2 Vector
5. Typographic tools	5.1 Illustrator 5.2 Adobe InDesign 5.3 Adobe Photoshop 5.4 Paint.net 5.5 Corel Draw
6. Types of printing	6.1 Digital 6.2 Flexography 6.3 Letterpress 6.4 Off set 6.5 Rotogravure 6.6 Screen

REQUIRED KNOWLEDGE AND UNDERSTANDING

The individual needs to demonstrate knowledge and understanding of:

1. Graphic design Concepts
2. Design elements and their uses
3. Design principles and their uses
4. Graphic Design Equipment
5. Graphic Design Tools
6. Typographic Techniques
7. Creation and Manipulation of Images
8. Types of File images
9. Printing types and formats
10. Printing chemicals, paper size and Weight.

FOUNDATION SKILLS

The individual needs to demonstrate the following foundation skills:

- Communications (verbal and written);
- Proficient in ICT;
- Time management;
- Analytical
- Planning;
- Decision making;

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required knowledge and understanding and range.

1. Critical Aspects of Competency	Assessment requires evidence that the candidate: 1.1 Identified Graphic design equipment according to the design to be drawn 1.2 Identified Graphic design elements, principles and techniques as per the design 1.3 Identified Measurements, standards and guidelines of typography. 1.4 Identified software and tools for Graphic Design and photography. 1.5 Created and manipulated images using the appropriate software. 1.6 Used Typographic tools to create dynamic layout 1.7 Identified tools and Equipment for printing and did the actual printing of the design.
2. Resource Implications	<i>The following resources must be provided:</i> Resources the same as that of workplace are advised to be applied 2.1 Computer 2.2 Authoring graphic design software, 2.3 Printer 2.4 Scanner 2.5 Camera 2.6 Stationery
3. Methods of Assessment	Competency may be assessed through: 3.1 Oral test 3.2 Observation 3.3 Practical demonstration
4. Context of Assessment	4.1 Competency may be assessed individually in the actual workplace or through a simulated work place setting
5. Guidance information	5.1 5.2 Holistic assessment with other units relevant to the industry

for assessment	sector, workplace and job role is recommended.
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DEVELOP COMPUTER PROGRAM

UNIT CODE: IT/OS/ICT/CR/10/6

UNIT DESCRIPTION

This unit covers the competencies required to Develop Computer Program. It involves Identifying program and programming concepts, identifying phases of program development, perform program design and Analysis, develop a Computer program, Perform Program testing and debugging, Perform User training and Program Maintenance.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT	PERFORMANCE CRITERIA (<i>Bold and italicised terms are elaborated in the Range</i>)
1 Identify program and programming concepts	1.1 Definition of program and programming is done 1.2 Types of programming languages are identified 1.3 Programming concepts are identified 1.4 Approaches of program development are identified
2 Identify Phases of Program development	2.1 Process of creating programs are identified 2.2 Phases of program development are identified 2.3 Activities that take place during Program Development are identified
3 Perform program design and Analysis	3.1 Program design and Analysis tools are identified 3.2 Algorithm writing tools are identified 3.3 Factors affecting program design and analysis are identified. 3.4 System development methodologies are identified 3.5 Criteria for choosing the appropriate methodology is done
4 Develop a Computer program	4.1 Format of a computer program is identified 4.2 Fundamentals of structured programming using C language are done 4.3 Fundamentals of Object Oriented programming using Java are done 4.4 Well written and readable programs using disciplined coding styles and standards are adopted

ELEMENT	PERFORMANCE CRITERIA <i>(Bold and italicised terms are elaborated in the Range)</i>
5 Perform Program testing and debugging	5.1 Difference between testing and debugging is understood. 5.2 Testing types, levels and methods are identified 5.3 Debugging steps, requirements, principles and techniques are identified 5.4 Error correction is done
6 Perform User training and Program Maintenance	6.1 User training needs are identified 6.2 Methods of user training are identified 6.3 User training manuals are generated 6.4 Maintenance schedule is developed 6.5 Maintenance tools and techniques are determined. 6.6 System performance is monitored, bugs are rectified and requested changes are made.

RANGE

This section provides work environment and conditions to which the performance Criteria apply. It allows for different work environment and situations that will affect Performance.

Variable	Range <i>May include but is not limited to:</i>
1. Types of programming languages	1.1 Imperative 1.2 Declarative 1.3 Functional 1.4 Object Oriented
2. Programming concepts	2.1 Program structure 2.2 Variable declaration 2.3 Looping structures 2.4 Control structures 2.5 Syntax
3. Algorithm writing tools	3.1 Flowcharts 3.2 Pseudocode 3.3 Modular charts 3.4 Decision tables 3.5 Decision trees 3.6 JSP 3.7 Data Flow Diagrams
4. System development methodologies	4.1 Waterflow 4.2 Agile 4.3 Spiral etc

REQUIRED KNOWLEDGE AND UNDERSTANDING

The individual needs to demonstrate knowledge and understanding of:

1. Programming concepts
2. Software development methodologies
3. System Design and Analysis tools
4. System testing debugging methods
5. Fundamentals of C, Java and PhP
6. Program development techniques
7. Data types and operators

FOUNDATION SKILLS

The individual needs to demonstrate the following foundation skills:

- Communications (verbal and written);
- Proficient in ICT;
- Time management;
- Analytical
- Planning;
- Decision making;
- Report writing;

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required knowledge and understanding and range.

1. Critical Aspects of Competency	Assessment requires evidence that the candidate: 1.1 Identified types of programming languages and concepts 1.2 Identified Approaches of program development 1.3 Identified Phases of program development 1.4 Identified Program design and Analysis tools 1.5 Identified Format of a computer program 1.6 Adopted Well written and readable programs using disciplined coding styles and standards 1.7 Developed Maintenance schedule 1.8 Determined Maintenance tools and techniques
2. Resource Implications	<i>The following resources must be provided:</i> 2.1 Resources the same as that of workplace are advised to be applied Networks, Hardware, Software, Data and People
3. Methods of Assessment	Competency may be assessed through: 3.1 Oral test 3.2 Observation 3.3 Practical demonstration
4. Context of Assessment	4.1 Competency may be assessed individually in the actual workplace or through a simulated work place setting
5. Guidance information for assessment	5.1 Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.

MOBILE APPLICATION DEVELOPMENT

UNIT CODE: IT/OS/ICT/CR/11/6

UNIT DESCRIPTION

This unit covers the competencies required to Develop Mobile Application. It involves identifying Mobile application concepts, identifying mobile application development environment, identifying Application Design Issues, developing of the mobile application, testing the developed mobile application and publishing and Commercialize the developed Application.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT	PERFORMANCE CRITERIA <i>(Bold and italicised terms are elaborated in the Range)</i>
1. Identify Mobile application concepts	1.1. Definition of Mobile application is done 1.2. Types of mobile applications are identified 1.3. Mobile application development platforms are identified 1.4. <i>Mobile application development approaches</i> are identified 1.5. Reasons for mobile application development are identified.
2. Identify mobile application development environment	1.1. Mobile Application Architecture and Design is identified 1.2. Mobile application development frameworks and tools are identified 1.3. Techniques and methodologies for mobile application development are introduced
3. Identify Application Design Issues	3.1. Mobile development lifecycle is explained 3.2. Overarching Design principles and Guidelines are explained 3.3. Mobile application <i>navigation patterns</i> are identified 3.4. User interface design is explained
4. Develop mobile	4.1. Appropriate mobile development software is

ELEMENT	PERFORMANCE CRITERIA (<i>Bold and italicised terms are elaborated in the Range</i>)
application	installed 4.2.Creation of the project structure is done by project wizard 4.3.Configuration of the <i>AndroidManifest.XML</i> file is done 4.4.<i>Resources</i> are defined in XML. 4.5.<i>Framework components</i> are defined 4.6.SQL lite database is introduced 4.7.Configuration of the google play SDK is done. 4.8.Project prototype is created as per the scope. 4.9.Build the project prototype into a debuggable APK That can be installed to an emulator or Android powered device.
5. Test the developed mobile application	5.1.Testing techniques and procedures are identified 5.2.Debugging techniques are identified 5.3.Debugging of the application is done.
6. Publish and Commercialize the developed Application	6.1.Application distribution through application stores is done 6.2.Monetizing applications through mobile money APIs is done. 6.3.Routine upgrading, and patching of the application is done.

RANGE

This section provides work environment and conditions to which the performance Criteria apply. It allows for different work environment and situations that will affect Performance.

Variable	Range <i>May include but is not limited to:</i>
1. Mobile application development approaches	1.1 Native 1.2 Hybrid Native 1.3 Hybrid web 1.4 Progressive web
2. Navigation patterns	2.1 Hamburger Menu 2.2 Tab bar 2.3 Gesture based
3. AndroidManifest.XML	3.1 Type of file that provides essential information about the android application
4. Resources	4.1 Res/Layout 4.2 Res/Menu 4.3 Res/Value 4.4 Res/Drawable
5. Framework components	5.1 Activity 5.2 Services 5.3 Broadcast receiver 5.4 Content provider

REQUIRED KNOWLEDGE AND UNDERSTANDING

The individual needs to demonstrate knowledge and understanding of:

1. Fundamentals of Mobile Application Concepts
2. Mobile Application Development Cycle
3. Platforms for Mobile Application Development
4. Types of Mobile Applications
5. Types of Mobile Application Development Software
6. Categories of Mobile Application Development Approaches
7. Technology Trends in the Mobile Market
8. Techniques of Distribution and Monetizing of Mobile Applications.

FOUNDATION SKILLS

The individual needs to demonstrate the following foundation skills:

- | | |
|---|--|
| <ul style="list-style-type: none">• Communications (verbal and written);• Proficient in ICT;• Time management;• Analytical• Planning; | <ul style="list-style-type: none">• Decision making;• Report writing; |
|---|--|

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required knowledge and understanding and range.

1. Critical Aspects of Competency	Assessment requires evidence that the candidate: 1.1 Identified Mobile application development platforms 1.2 Identified Mobile application development frameworks and tools 1.3 Installed and Configured Appropriate mobile development software 1.4 Built the project prototype into a debuggable APK that can be installed to an emulator or Android powered device. 1.5 Tested and Debugged the Application 1.6 Published the Application
2. Resource Implications	<i>The following resources must be provided:</i> 2.1 Resources the same as that of workplace are advised to be applied Computer, Software, Internet, Data
3. Methods of Assessment	Competency may be assessed through: 3.1 Oral test 3.2 Observation 3.3 Practical demonstration
4. Context of Assessment	4.1 Competency may be assessed individually in the actual workplace or through a simulated work place setting
5. Guidance information for assessment	5.1 Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.

PERFORM SYSTEM ANALYSIS AND DESIGN

UNIT CODE: IT/OS/ICT/CR/12/6

UNIT DESCRIPTION

This unit covers the competencies required to perform system analysis and design. It involves understanding System Analysis and Design Fundamentals, understanding approaches to system Development and Project planning, Performing System Analysis, identifying Essentials of System Design, understanding advanced Design Concepts, Performing System Implementation and understand Current Trends in System Development.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT	PERFORMANCE CRITERIA <i>(Bold and italicised terms are elaborated in the Range)</i>
1. Understand System Analysis and Design Fundamentals	1.1.Definition of system, system design and system Analysis is done. 1.2.Constraints of a system are identified 1.3.Properties of a system are identified 1.4.Elements of a system are identified 1.5.Classification of systems is done. 1.6.Types of Information system are identified 1.7.System models are identified 1.8.Categories of Information are identified.
2. Understand Approaches to system Development and Project planning.	2.1.System development Approaches are identified 2.2.System development methodologies are identified 2.3. System development life cycle models are identified 2.4.Activities involved in SDLC are identified. 2.5. SDLC phases are identified. 2.6.Project planning concepts are identified
3. Perform System Analysis	3.1.Overview of system analysis is done. 3.2. Attributes of structured analysis are identified 3.3.Tools and techniques of system analysis are identified. 3.4.Activities performed during System analysis are identified
4. Identify Essentials of	4.1.Design with Software specification requirements

ELEMENT	PERFORMANCE CRITERIA (<i>Bold and italicised terms are elaborated in the Range</i>)
System Design	(SRS) document 4.2. <i>Components of system design</i> are identified 4.3.Inputs and outputs of System Design are identified 4.4. <i>Stages of system design</i> are identified 4.5.Types of system design are identified 4.6. <i>Data Modelling techniques</i> are identified
5. Understand advanced Design Concepts	5.1.Types of Advance Design modelling are identified 5.2.File Organization and access methods are identified 5.3.Design strategies are identified 5.4.System design Security and control measures are identified 5.5.Structured Design concepts are identified
6. Perform System Implementation	6.1.System implementation procedures are identified 6.2. <i>Types of the system testing</i> are identified 6.3.Deployment procedures of the system are identified
7. Understand Current Trends in System Development	7.1.Frameworks, components and services are identified 7.2.Model driven architecture is understood 7.3.Adaptive methodologies to development are understood 7.4.Software principles and practices are identified

RANGE

This section provides work environment and conditions to which the performance Criteria apply. It allows for different work environment and situations that will affect Performance.

Variable	Range <i>May include but is not limited to:</i>
1. System development life cycle models	1.1 Waterfall 1.2 Prototyping 1.3 Dynamic system Development model (DSDM) 1.4 Object oriented model
2. SDLC phases	2.1 Planning 2.2 Analysis 2.3 Design 2.4 Implementation 2.5 Maintenance
3. Attributes of structures analysis	3.1 Graphic 3.2 Logical 3.3 Process division 3.4 High level to lower level approach
4. Components of system design	4.1 Quality 4.2 Timeliness 4.3 Cost-Effectiveness
5. Stages of system design	5.1 Requirements determination 5.2 Requirements specifications 5.3 Feasibility Analysis 5.4 Final Specifications 5.5 Hardware study 5.6 System Design
6. Data Modelling techniques	6.1 Conceptual 6.2 Relational 6.3 Object Oriented
7. Types of the system testing	7.1 Software 7.2 Unit 7.3 Integration 7.4 usability

REQUIRED KNOWLEDGE AND UNDERSTANDING

The individual needs to demonstrate knowledge and understanding of:

1. system design and system Analysis concepts
2. System development Approaches
3. System development methodologies
4. System development life cycle models
5. SDLC phases are identified.
6. Project planning concepts
7. Tools and techniques of system analysis
8. Activities performed during System analysis
9. Components and concepts of system design
10. Data Modelling techniques
11. System implementation procedures
12. Types of the system testing
13. Deployment procedures of the system

FOUNDATION SKILLS

The individual needs to demonstrate the following foundation skills:

- Communications (verbal and written);
- Proficient in ICT;
- Time management;
- Analytical
- Planning;
- Decision making;
- Report writing;

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required knowledge and understanding and range.

1. Critical Aspects of Competency	Assessment requires evidence that the candidate: 1. Should be able to differentiate between system analysis and design 2. Identified activities and phases involved in SDLC 3. Identified tools, techniques and activities of system analysis 4. Identified components, stages and types of system design 5. Identified data modeling techniques 6. Identified different types of advanced system design modelling 7. Identified system implementation procedures 8. Identified current trends in system development
2. Resource Implications	<i>The following resources must be provided:</i> 2.1 Resources the same as that of workplace are advised to be applied Computer, Software, virtual users
3. Methods of Assessment	Competency may be assessed through: 3.1 Oral test 3.2 Observation 3.3 Practical demonstration
4. Context of Assessment	4.1 Competency may be assessed individually in the actual workplace or through a simulated work place setting
5. Guidance information for assessment	5.1 Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.

