

**REPUBLIC OF KENYA**

**KENYA OCCUPATIONAL STANDARDS**

**FOR**

**NETWORK SYSTEM ADMINISTRATOR**

**KNQF LEVEL 6**

**PROGRAMME CODE: 0612454A**

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# FOREWORD

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

Reforms in the education sector are necessary to achieve Kenya Vision 2030 and meet the provisions of the Constitution of Kenya 2010. The education sector had to be aligned to the Constitution, and this resulted in the formulation of the Policy Framework for Reforming Education and Training in Kenya (Sessional Paper No. 14 of 2012). A key feature of this policy is the radical change in the design and delivery of 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 the mode of delivery allow for multiple entry and exit in TVET programmes.

These reforms demand that Industry takes a leading role in curriculum development to ensure the curriculum addresses its competence needs. It is against this background that this curriculum has been developed. For trainees to build their skills on foundational hands-on activities of the occupation, units of learning are grouped in modules. This has eliminated duplication of content and streamlined exemptions based on skills acquired as a trainee progresses in the up-skilling process, while at the same time allowing trainees to be employable in the shortest time possible through the acquisition of part qualifications.

It is my conviction that this occupational standards will play a great role in developing competent human resources for the ICT Sector’s growth and development.

# PREFACE

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

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

Industry experts in conjunction with experienced trainers from qualification awarding institutions developed these Occupational Standards.

These Occupational Standards are designed and organized with an outline of duties and tasks which are employable and the evidence guide for effective training. They also allow multiple entry and exit to the course.

I am grateful to the Council Members, Council Secretary, industrial experts in Information and Communication Technology sector, experienced trainers and all those who participated in the development of these Occupational Standards.

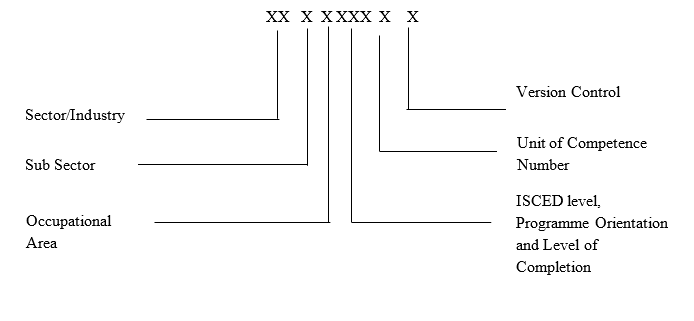
# ACKNOWLEDGEMENT

This Occupational Standards has been designed for competency-based training and has independent units of learning that allow the trainee flexibility in entry and exit. In developing the curriculum, significant involvement and support were received from expert trainers, institutions and organizations.

I recognize with appreciation the role of the ICT National Sector Skills Committee (NSSC) in ensuring that competencies required by the industry are addressed in the curriculum. I also thank all stakeholders in the ICT sector for their valuable input and everyone who participated in developing this curriculum.

I am convinced that this Occupational Standards will go a long way in ensuring that individuals aspiring to work in the ICT sector acquire competencies to perform their work more efficiently and effectively.

KEY TO UNIT CODE



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# ABBREVIATION AND ACRONYMS

ASCII American Standard Code for Information Interchange

BCD Binary-Coded Decimal

CAD Computer-Aided Design

CCTV Closed Circuit Television

CD Compact Disc

IOS Internetwork Operating System

CPU Central Processing Unit

CV Curriculum Vitae

DTB Device Tree Blob

EBCDIC Extended Binary-Coded Decimal Interchange Code

ICT Information Communication Technology

IEEE Institute of Electrical and Electronics Engineers

IP Internet Protocol

KCSE Kenya Certificate of Secondary Education

KNQA Kenya National Qualification Authority

KNQF Kenya National Qualification Framework

LAN Local Area Network

MAC Media Access Control

NOS Network Operating System

POST Power on Self-Test

PRTG Paessler Router Traffic Grapher

RAM Random Access Memory

SFP Small Form-factor Pluggable

SNMP Simple Network Management Protocol

SQL Structured Query Language

STP Spanning Tree Protocol

TVET Technical and Vocational Education and Training

TVETA Technical and Vocational Education and Training Authority

URI Uniform Resource Identifier

URL Uniform Resource Locator

USB Universal Serial Bus

UTP Unshielded Twisted Pair

VGA Video Graphics Array

VLAN Virtual Local Area Network

WAN Wide Area Network

# OCCUPATIONAL STANDARD OVERVIEW

Network System Admistration Level 6 qualification consists of competencies that a person must achieve to enable him/her to be certified as a Network System Administration.

Network system Technician is a person who can demonstrate knowledge and competence in designing a computer network, installing a computer network, monitoring computer network security and performing computer repair and maintenance.

Therefore, Network system administration is a well-trained person who can carry out these responsibilities. These responsibilities comprise the units of competency of a Network administration level 6 which include the following basic, common and core competencies:

**SUMMARY OF UNITS OF COMPETENCY**

|  |  |
| --- | --- |
| **UNIT CODE** | **UNIT NAME** |
| **BASIC UNITS OF COMPETENCIES** | |
| 0611 441 01A | Apply Computer Application |
| 0417 451 02A | Apply Work Ethics and Practices |
| 0031 551 01A | Apply Communication Skills |
| 0732 551 02A | Apply Entrepreneurial Skills |
| **COMMON UNITS OF COMPETENCIES** | |
| 0714 451 03A | Perform Computer Repair and Maintenance |
| 0714 441 04A | Apply Basic Electronics |
| 0541 551 03A | Apply Discrete Mathematical Concepts |
| **CORE UNITS OF COMPETENCIES** | |
| 0612 451 05A | Design Computer Network |
| 0612 451 06A | Setup Computer Network |
| 0612 451 07A | Install Computer Network Software |
| 0612 451 08A | Configure Computer Network Security |
| 0612 451 09A | Perform Computer Network Maintenance |
| 0612 451 10A | Monitor Computer Network Security |
| 0612 551 04A | Perform Computer System Administration |
| 0612 551 05A | Perform Database Administration |
| 0612 551 06A | Perform System Virtualization |
|  | INDUSTRIAL TRAINING |

# BASIC UNITS OF COMPETENCY

## APPLY COMPUTER APPLICATIONS

**UNIT CODE:** 0611 441 01A

**UNIT DESCRIPTION**

This unit covers the competencies in applying computer applications. It involves the ability to: perform word processing, operate spreadsheet program, prepare PowerPoint presentation, perform document production and manage online resources.

**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.  ***Bold and italicized terms*** ***are elaborated in the Range*** |
|
| 1. Perform word processing | * 1. Ergonomics risk factors observed as per work place procedures |
| * 1. Word document is created as per work requirements |
| * 1. Tables are created and manipulated as per work requirements |
| * 1. Mail merging is performed as per work requirements |
| * 1. ***Word processing Objects*** are inserted as per user requirements |
| * 1. List of figures and table of content are generated as per user requirements |
| 1. Operate spreadsheet programs | 1. Spreadsheet workbook is created as per work requirements |
| 1. Cell referencing is performed as per task requirements |
| 1. Formula and ***functions*** are applied as per work requirements |
| 1. Charts are generated as per work requirements |
| 1. Prepare Power point presentation | 1. Power-point slides are created as per work requirements |
| 1. ***Presentation views*** are exhibited as per work requirements |
| 1. Animations and transitions are performed as per work requirements |
| 1. Slideshow is Presented as per work requirements |
| 1. Perform document production | 1. Document is printed as per user specifications |
| 1. Documents are scanned as per user specifications |
| 1. Documents are duplicated as per user specifications |
| 1. Manage online Resources | 1. Online file transfer is performed as per work requirements |
| 1. ***Online document processing*** is performed as per work |
| requirements   1. ***Online collaboration*** is performed as per task requirements |

**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. Word Processing Objects may include but are not limited to: | * Picture * Shapes * Table * Charts |
| 1. Functions may include but are not limited to: | * Sum * Count * Average * Max * Min * Rank |
| 1. Presentation views may include but are not limited to: | These are the methods used to show the presentation to the audience.   * Outline * Normal * Slide sorter * Notes page * Reading view |
| 1. Online document processing may include but is not limited to: | Is the use of web-based applications or platforms to create, edit, store, share and collaborate on various types of documents.   * Online data entry * File conversion * Google documents * E- tasks |
| 1. Online collaboration: This may include but not limited to: | These are the online web-based tools and services performed   * Video conferencing * Chatting * Cloud computing * Social media * Online calendar * Mailing |

**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:

* Communication skills
* Evaluation skills
* Problem solving skills
* Time management

**Required Knowledge**

The individual needs to demonstrate knowledge of:

* Social media
* Online storage
* Online meetings
* Online data entry
* E-tasks

**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. Created a word document 2. Inserted objects 3. Performed mail merging 4. Created a table of contents 5. Created a workbook 6. Performed cell referencing 7. Created formula and functions 8. Generated charts 9. Created slides 10. Made a presentation 11. Created animations and transitions 12. Printed a document 13. Scanned a document 14. Duplicated a document 15. Transferred a file online 16. Processed a document online 17. Performed online collaboration |
| 1. Resource Implications | The following resources should be provided:   1. Access to relevant workplace where assessment can take place 2. Appropriately simulated environment where assessment can take place |
| 1. Methods of Assessment | Competency may be assessed through:   * 1. Demonstration   2. Practical assignment   3. Oral Questioning   4. Written Test |
| 1. Context of Assessment | Competency may be assessed:   1. On-the-job 2. In a simulated work environment |
| 1. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended. |

## APPLY WORK ETHICS AND PRACTICES

**UNIT CODE:** 0417 451 02A

**UNIT DESCRIPTION**

This unit covers competencies required to effectively apply work ethics and practices. It involves the ability to: conduct self-management, promote ethical work practices and values, promote teamwork, manage workplace conflicts, maintain professional and personal development, apply problem-solving and promote customer care.

**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.  ***Bold and italicized terms are elaborated in Range*** |
| 1. Apply self-management skills | 1. Personal vision, mission and goals are formulated based on potential and concerning organization objectives and strategic plan 2. Self-esteem and a positive self-image are developed and maintained based on value 3. Emotional intelligence and stress management are demonstrated as per workplace requirements. 4. Assertiveness is developed and maintained based on the requirements of the job. 5. Accountability and responsibility for one's actions are demonstrated based on workplace instructions. 6. Time management, attendance and punctuality are observed as per the organization’s policy. 7. Personal goals are managed as per the organization’s objective 8. Self-strengths and weaknesses are identified based on personal objectives 9. Motivation, initiative and proactivity are utilized as per the organization policy 10. Individual performance is evaluated and monitored according to the agreed targets. |
| 1. Promote ethical work practices and values | 1. Integrity is demonstrated as per acceptable norms 2. Codes of conduct is applied as per the workplace requirements 3. Policies and guidelines are observed as per the workplace requirements 4. Professionalism is exercised in line with organizational policies |
| 1. Promote Team work | 3.1 ***Teams*** are formed to enhance productivity based on organization’s objectives  3.2 Duties are assigned to teams under the organization policy.  3.3 Team activities are managed and coordinated as per set objectives.  3.4 Team performance is evaluated based on set targets as per workplace policy.  3.5 ***Conflicts*** are resolved between team members in line with organization policy.  3.6 Gender and diversity-related issues are identified and mainstreamed in accordance with workplace policy.  3.7 Healthy ***relationships*** are developed and maintained in line with the workplace.  3.8 Adaptability and flexibility are applied in dealing with team members as per workplace policies |
| 1. Maintain professional and personal development | 4.1 ***Personal growth and development*** needs are identified and assessed in line with the requirements of the job.  *4.2* ***Training and career opportunities*** are identified and utilized based on job requirements.  4.3 ***Resources*** for training are mobilized and allocated based on organizations and individual skills needs.  4.4 Licenses and certifications relevant to the job and career are obtained and renewed as per policy.  4.5 Recognitions are sought as proof of career advancement in line with professional requirements.  4.6 Work priorities and personal commitments are balanced and managed based on the requirements of the job and personal objectives.  4.7 Dynamism and on-the-job learning are embraced in line with the organization’s goals and objectives. |
| 1. Apply Problem solving skills | 5.1 ***Creative, innovative*** and practical solutions are developed based on the problem  5.2 Independence and initiative in identifying and solving problems are demonstrated based on the requirements of the job.  5.3 Team problems are solved as per the workplace guidelines  5.4 Problem-solving strategies are applied as per the workplace guidelines  5.5 Problems are analyzed and assumptions tested as per the context of data and circumstances |
| 1. Promote Customer Care | 6.1 Customers' needs are identified based on their characteristics  6.2 Customer ***feedback*** is allowed and facilitated in line with organization policies.  6.3 Customer concerns and complaints are analyzed and resolved in line with the set organizational culture.  6.4 Proactive customer outreach programs are implemented as per organizational policies  6.5 Customer retention strategies are developed and implemented in line with the organizational 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** |
| 1. Feedback may include but not limited to: | * Verbal * Written * Informal * Formal |
| 1. Conflicts include but are not limited to: | * Interpersonal Conflict. * Intrapersonal Conflict. * Intergroup Conflict. * Intragroup Conflict. |
| 1. Relationships may include but not limited to: | * Man/Woman * Trainer/trainee * Employee/employer * Client/service provider * Husband/wife * Boy/girl * Parent/child * Sibling relationships |
| 1. Team may include but not limited to: | * Small work group * Staff in a section/department * Inter-agency group * Virtual teams |
| 1. Personal growth may include 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 |
| 1. Personal objectives may include but not limited to: | * Long term * Short term * Broad * Specific |
| 1. Trainings and career opportunities may include but not limited to | * Participation in training programs * Serving as Resource Persons in conferences and workshops * Capacity building |
| 1. Resource may include may but not limited to: | * Human * Financial * Technology |
| 1. Creative and innovative may include but not limited to: | * New ideas * Original ideas * Different ideas * Methods/procedures * Processes * New tools |
| 1. Emerging issues may include but not limited to: | * Artificial Intelligence * Data confidentiality * National cohesion * Open offices |

**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:

* Active listening
* Critical thinking
* Organizational
* Negotiation
* Monitoring
* Evaluation
* Problem solving
* Decision Making
* Leadership
* Creative/innovative thinking
* Adaptability
* Conflict management
* Emotional intelligence
* Teamwork

**Required Knowledge**

The individual needs to demonstrate knowledge of:

* Work values and ethics
* Company policies and procedures
* Company operations, procedures and standards
* Flexibility and adaptability
* Concept of time and leisure time
* Decision making
* Work planning
* Organizing work
* Monitoring and evaluation
* Record keeping
* Gender and diversity mainstreaming
* Drug and substance abuse
* Professional growth and development
* Creativity
* Innovation
* Problem solving
* Customer care
* Mentoring and coaching.
* Emerging 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 require evidence that the candidate:   * 1. Applied self-management skills as per organizational procedures.   2. Promoted ethical practices and values as per organizational procedures.   3. Promoted Teamwork as per workplace assignments.   4. Maintained professional and personal development as per organizational procedures.   5. Applied Problem-solving skills based on work requirements.   6. Identified customer needs based on their characteristics.   7. Gave back Customer feedback in line with organization policies. |
| 1. Resource Implications | The following resources should be provided:   1. Access to relevant workplace where assessment can take place 2. Appropriately simulated environment where assessment can take place. 3. Resources relevant to the proposed activity or tasks. |
| 1. Methods of Assessment | Competency in this unit may be assessed through:   1. Observation 2. Oral questioning 3. Written test 4. Portfolio of Evidence 5. Interview 6. Third party report |
| 1. Context of Assessment | This Competency may be assessed in a workplace or a simulated workplace |
| 1. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended. |

## APPLY COMMUNICATION SKILLS

**UNIT CODE:** 0031 551 01A

**UNIT DESCRIPTION**

This unit covers the competencies required to demonstrate communication skills. It involves applying communication channels, written, non-verbal, oral, and group communication skills.

**ELEMENTS AND PERFORMANCE CRITERIA**

|  |  |
| --- | --- |
| **ELEMENT**  These describe the key outcomes that make up workplace function | **PERFORMANCE CRITERIA**  These are assessable statements that specify the required level of performance for each of the elements.  ***Bold and italicized terms are elaborated in the Range*** |
| 1. Apply communication channels | 1. Specific communication channels are identified and applied based on workplace requirements. 2. Challenges are identified and addressed as per the operational standards of the organization. 3. Communication channels are evaluated to meet workplace needs. |
| 1. Apply written communication skills | * 1. Types of written communication are identified and applied according to the workplace requirements.   2. Written communication needs are identified and implemented according to workplace procedures.   3. Written communication guidelines are analyzed, evaluated, and revised based on workplace needs. |
| 1. Apply non-verbal communication skills | 3.1 Existing non-verbal communication techniques are identified and applied based on organization policy.  3.2 Non-verbal communication techniques are articulated and modeled to enhance inclusivity according to workplace requirements. |
| 1. Apply oral communication skills | 4.1 Types of oral communication are identified and established as per organization policy.  4.2 Pathways of oral communication are identified and established as per organization policy.  4.3 Pathways of oral communication are reviewed according to organization procedures.  4.4 Pathways of oral communication are maintained according to the organization standards. |
| 1. Apply group communication skills | 1. Group communication strategies are appliedbased on the workplace needs. 2. Groups are organized in accordance with workplace procedures. 3. Effective questioning, listening and non-verbal communication techniques are used as per needs.   5.4 Group communication challenges are identified and addressed according to the workplace needs. |

**RANGE**

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

|  |  |
| --- | --- |
| **Variable** | **Range** |
| 1. Communication strategies may include but are not limited to: | * Language switch * Comprehension check * Repetition * Asking confirmation * Paraphrasing * Clarification request * Translation * Restructuring * Generalization |
| 1. Effective group interaction may include but not limited to: | * Identifying and evaluating what is occurring within an interaction in a non-judgmental 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 |
| 1. Situations may include but are not limited to: | * Establishing rapport * Eliciting facts and information * Facilitating resolution of issues * Developing action plans |

**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:

* Active listening
* Interpretation
* Negotiation
* Writing
* Oral skills
* Creative thinking
* Critical thinking
* Decision making
* Analytical
* Innovation
* Conflict skills
* Leadership
* Problem solving skills
* Management
* Organizational
* Teamwork

**Required Knowledge**

The individual needs to demonstrate knowledge of:

* Communication process
* Dynamics of groups
* Styles of group leadership
* Key elements of communications strategy
* Principles of effective communication
* Turn-taking techniques
* Conflict resolution techniques
* Work planning
* Work organization
* Company policies
* Company operations and procedure standards
* Fundamental rights at the workplace
* Personal hygiene
* Accountability
* Workplace problems and how to deal with them

**EVIDENCE GUIDE**

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

|  |  |
| --- | --- |
| 1. Critical aspects of Competency. | Assessment requires evidence that the candidate:   * 1. Identified and applied specific communication channels based on workplace requirements.   2. Identified and applied specific written communication correspondence according to the workplace requirements.   3. Applied and developed non-verbal strategies to communicate in all areas of the workplace requirements.   4. Established pathways of oral communication as per workplace policy.   5. Applied group communication strategies based on workplace needs. |
| 1. Resource Implications | The following resources should be provided:   1. Access to relevant workplace where assessment can take place. 2. Appropriately simulated environment where assessment can take place. 3. Resources relevant to the proposed activity or tasks. |
| 1. Methods of Assessment | Competency in this unit may be assessed through:   * 1. Practical assessment   2. Observation   3. Oral assessment   4. Portfolio of evidence   5. Interviews   6. Third party report   7. Written assessment   8. Projects |
| 1. Context of Assessment | 4.1 This Competency may be assessed in a workplace or a simulated workplace |
| 1. Guidance information for assessment | 5.1 Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended. |

## APPLY ENTREPRENEURIAL SKILLS

**UNIT CODE:** 0732 551 02A

**UNIT DESCRIPTION**

This unit covers the competencies required to demonstrate an understanding of entrepreneurship. It involves demonstrating an understanding of financial literacy, applying entrepreneurial concepts identifying entrepreneurship opportunities, applying business legal aspects, developing business innovative strategies, and developing business plans.

**ELEMENTS AND PERFORMANCE CRITERIA**

|  |  |
| --- | --- |
| **ELEMENT**  These describe the key outcomes that make up workplace function. | **PERFORMANCE CRITERIA**  These are assessable statements that specify the required level of performance for each of the elements.  ***Bold and italicized terms are elaborated in Range*** |
|
| 1. Apply Financial Literacy Skills | 1. **Sources of personal and business** ***funds*** are identified as per financial procedures and standards |
| 1. Personal finances are managed as per financial procedures and standards |
| 1. Savings are managed as per financial procedures and standards |
| 1. Debts are managed as per financial procedures and standards |
| 1. Investments are undertaken as per financial procedures and standards |
| 1. Insurance services are procured as per financial procedures and standards |
| 1. Apply entrepreneurial concept | 1. Entrepreneurs and Business persons are distinguished as per principles of entrepreneurship |
| 1. ***Types of entrepreneurs*** are identified as per principles of entrepreneurship |
| 1. Ways of becoming an entrepreneur are identified as per principles of Entrepreneurship |
| 1. ***Characteristics of Entrepreneurs*** are identified as per principles of Entrepreneurship |
| 1. Salaried employment and self-employment are distinguished as per principles of entrepreneurship |
| 1. ***Requirements for entry into self-employment*** are identified according to business procedures and standards |
| 1. Roles of an Entrepreneur in an enterprise are determined according to business procedures and standards |
| 1. **Contributions of entrepreneurship** to National development are identified as per business procedures and standards |
| 1. Identify entrepreneurial opportunities | 1. Business ideas are identified as per business procedures and standards |
| 1. Factors to consider when evaluating business opportunity viability are explored based on business procedure and standards |
| 1. Entrepreneurial opportunities are evaluated as per business procedures and standards |
| 1. Business ideas and opportunities are generated as per business procedures and standards |
| 1. Business life cycle is analyzed as per business procedures and standards |
| 1. Apply business legal aspects | 1. ***Forms of business ownership*** are identified as per legal procedures and practices |
| 1. Business Registration and Licensing processes are identified as per legal procedures and practices |
| 1. Types of Contracts and Agreements are analyzed as per legal procedures and practices |
| 1. Employment Laws are identified as per legal procedures and practices |
| 1. Taxation laws are identified as per legal procedures and practices |
| 1. Innovate Business strategies | 1. Business innovation strategies are determined by the organization standards |
| 1. Creativity in business development is demonstrated in accordance with business standards |
| 1. ***Innovative business standards*** are developed as per business principles |
| 1. Linkages with other entrepreneurs are created as per best practice |
| 1. ICT is incorporated in business growth and development as per best practice |
| 1. Develop Business Plan | 1. Business idea is described as per business procedures and standards |
| 1. Business description is developed as per business plan format |
| 1. Marketing plan is developed as per business plan format |
| 1. Organizational/Management plan is prepared in accordance with business plan format |
| 1. Production/operation plan is prepared in accordance with business plan format |
| 1. Financial plan is prepared in accordance with the business plan format |
| 1. Executive summary is prepared in accordance with business plan format |
| 1. Business plan is presented as per best practice |
| 1. Business ideas are incubated as per institutional 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** |
| 1. Sources of personal funds mayinclude but not limited to: | * Salary/Wages * Investments * Savings * Inheritance * Government Benefits |
| 1. Sources of business finance mayinclude but not limited to: | * Equity Financing * Debt Financing, * Personal Savings/Investment * Retained Earnings * Grants and Subsidies * Crowdfunding * supplier Credit: * Leasing and Asset Financing: |
| 1. Types of entrepreneurs may include but not limited to: | * Innovators * Imitators * Craft * Opportunistic * Speculators |
| 1. Characteristics of Entrepreneurs may include but not limited to: | * Creative * Innovative * Planner * Risk taker * Networker * Confident * Flexible * Persistent * Patient * Independent * Future oriented * Goal oriented |
| 1. Requirements for entry into self-employment may include but not limited to | * Technical skills * Management skills * Entrepreneurial skills * Resources * Infrastructure |
| 1. Forms of businesses ownership may include but not limited to: | * Sole proprietorship * Partnership * Limited companies * Cooperatives |
| 1. Innovative business standards may include but not limited to: | * New products * New methods of production * New markets * New sources of supplies * Change in industrialization |

**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
* Management
* Problem-solving
* Root-cause analysis
* Communication

**Required Knowledge**

The individual needs to demonstrate knowledge of:

* Decision making
* Business communication
* Change management
* Competition
* Risk
* 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 standards
* 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 standards
* Market and feasibility studies
* Government and regulatory processes
* Local and international business environment
* Relevant developments in other industries
* Regional/ County business expansion standards

**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. Identified Sources of personal and business finance as per financial procedures and standards 2. Managed Personal finances as per financial procedures and standards 3. Made Investment decisions as per financial procedures and standards 4. GeneratedBusiness ideas and opportunities based on business procedure and standards 5. Analyzed business life cycle based on business procedure and standards 6. Determined business innovative standards as per business principles 7. Developed and presented a business plan as per regulatory framework. |
| 1. Resource Implications | The following resources should be provided:   1. Access to relevant workplace where assessment can take place 2. Appropriately simulated environment where assessment can take place |
| 1. Methods of Assessment | Competency may be assessed through:   1. Written tests 2. Oral questions 3. Third party report 4. Interviews 5. Portfolio |
| 1. Context of Assessment | Competency may be assessed:   1. On-the-job 2. In a simulated work environment |
| 1. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended. |

# COMMON UNITS OF COMPETENCY

## PERFORM COMPUTER REPAIR AND MAINTENANCE

**UNIT CODE:** 0714 451 03A

**UNIT DESCRIPTION:**

This unit covers the competencies required for performing computer repair and maintenance. It involves the ability to: perform computer troubleshooting, repair faulty components, Test computer component functionality and perform computer maintenance.

**ELEMENTS AND PERFORMANCE CRITERIA**

|  |  |
| --- | --- |
| **ELEMENT**  These describe the key outcomes which make up workplace functions | **PERFORMANCE CRITERIA**  These are assessable statements which specify the required level of performance for each of the elements.  ***(Bold and italicized terms are elaborated in the range)*** |
|
| 1. Perform computer troubleshooting | * 1. User data is assessed as per workplace procedures. |
| * 1. Computer problems are identified as per the assessed user data. |
| * 1. Solution to the problem is determined as per workplace procedure. |
| 1. Repair faulty components. | * 1. ***Computer components*** for replacement are selected as per the workplace procedure. |
| * 1. ***Tools* for repairing or replacing** are assembled as per the workplace procedure. |
| * 1. ***Safety procedures*** are observed as per workplace procedures. |
| * 1. Faulty computer components are repaired or replaced as per the manufacturer’s manual. |
| * 1. Obsolete or faulty computer components are ***disposed*** as per workplace procedures. |
| 1. Test computer component functionality | * 1. Computer is switched on for POST test as per workplace procedure. |
| * 1. Computer component test is performed as per workplace procedure. |
| * 1. Computer component’s functionality report is generated as per workplace procedure. |
| 1. Perform computer maintenance | * 1. Computer maintenance is scheduled as per the workplace procedure. |
| * 1. Computer maintenance is performed as per the workplace procedure. |
| * 1. Computer maintenance report is generated as per workplace procedure. |

**RANGE**

|  |  |
| --- | --- |
| **Variable** | **Range** |
| 1. Computer components may include but are not limited to: | * + Input components.   + Output components.   + Storage components   + Processing components   + Communication components |
| 1. Safety procedures may include but are not limited to: | Personal Protective Equipment:   * + Overall/apron/dust coat   + Antiglare screens   + Dust mask   + Gloves   + Safety boots   + Antistatic equipment   + Antistatic wrist strap   + Antistatic mat   + Antistatic gloves   + Ergonomics   + First AID kit |
| 1. Tools for repairing or replacing may include but are not limited to: | * + Straight-head screwdriver, large and small   + Phillips-head screwdriver, large and small   + Tweezers or part retriever   + Needle-nosed pliers   + Wire cutters   + Chip extractor   + Hex wrench set   + Torx screwdriver |
| 1. Disposed may include but are not limited to: | * + E- waste   + Pollution   + Hazards   + Disposal methods |

**REQUIRED KNOWLEDGE AND SKILLS**

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

**Required knowledge**

The individual needs to demonstrate knowledge of:

* Troubleshooting techniques
* Procedures and techniques for reassembling
* Component testing techniques
* Computer systems and their components
* The manufacturer's warranty requirements relating to activities for the computer and related components.
* Types of Computer/component testing
* Types of Maintenance techniques

**Required skills**

The individual needs to demonstrate the following skills:

* Communications skills
* Proficient in ICT
* Time management
* Faults troubleshooting
* Problem solving
* Planning
* First aid
* Critical thinking

**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. Identified computer problems as per the assessed user data. 2. Determined solution to the problem as per workplace procedure. 3. Selected computer components for replacement as per the workplace procedure. 4. Assembled tools for repairing or replacing as per the workplace procedure. 5. Repaired or replaced faulty computer components as per the manufacturer’s manual. 6. Performed computer component test as per workplace procedure. 7. Performed computer maintenance as per the workplace procedure. |
| 1. Resource implications | The following resources should be provided:  Appropriately simulated environment where assessment can take place.   * 1. Access to relevant work environment   2. Resources relevant to the proposed activities or tasks. |
| 1. Methods of assessment | Competency may be assessed through:   * 1. Practical   2. Projects   3. Third Party Reports   4. Portfolio of evidence   5. Written tests |
| 1. Context of Assessment | Competency may be assessed in a workplace or in a simulated workplace |
| 1. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector, workplace job role is recommended. |

## APPLY BASIC ELECTRONICS

**UNIT CODE:** 0714 441 04A

**UNIT DESCRIPTION**

This unit specifies the competencies required to apply basic electronic. It involves identifying electric circuits, identifying electronic components, understanding semi-conductor theory, identifying memories, applying number systems, applying logic gates and performing Boolean algebra operations.

**ELEMENTS AND PERFORMANCE CRETIRIA**

|  |  |
| --- | --- |
| **ELEMENT**  *These describe the key outcomes which make up workplace functions* | **PERFORMANCE CRITERIA**  These are assessable statements *which specify the required level of performance for each of the elements*  ***(Bold and italicized terms are elaborated in the range)*** |
|
| 1. Identify electrical circuits | * 1. Electrical circuit are identified as per electrical engineering principles |
| * 1. ***Electrical quantities and their S.I units*** are identified as per electrical engineering standards |
| * 1. ***Types of electrical circuits*** are identified as per electrical engineering standards |
| 1. Identify electronic components | * 1. Electronic components are Identified as per electrical engineering standard |
| * 1. Characteristic of electroniccomponents are identified as per their operations |
| * 1. Application of electronic components are Identified as per workplace functions |
| * 1. Characteristics of integrated circuit are identified as per the standard mode of operations. |
| 1. Apply Semi-conductor theory | * 1. Explanation of semiconductor theory is done as per the electronics principles. |
| * 1. Structure of matter is described as per electronics principles |
| * 1. Electrons in conductors and semiconductors are explained as per electronics principles |
| * 1. Types of semiconductor materials are identified as per electronics principles |
| * 1. P-type and N-type materials are explained as per electronics principles |
| * 1. Description of P-N junction diodes operations is done as per their operations |
| * 1. Types and operations of transistors are identified as per electronics principles |
| * 1. Semiconductor theory is applied in electrical circuits as per electronics principles |
| 1. Classify computer memory | * 1. ***Classification of computer memories*** are identified as per their characteristics |
| * 1. Memory hierarchy is identified as per memory speed |
| * 1. ***Levels of memory storage*** are identified as per technology used. |
| * 1. Classification of memories is done as per the technology used |
| 1. Apply logic gates | * 1. Logic gates are identified as per the Digital Electronics principles |
| * 1. Logic circuits are developed as per the standard procedures |
| * 1. Logic circuits are simplified as per the standard procedures |
| * 1. Apply logic gates in electronic circuits as per digital Electronics principles |
| 1. Perform Boolean algebra operations | * 1. Key concepts in Boolean algebra are explained as per the digital electronics principles |
| * 1. Boolean Expressions are demonstrated as per the SOPs |
| * 1. Basic Boolean operations are performed as per the SOPs |
| * 1. Methods of simplifying Boolean expressions are illustrated as per the SOPs |
| * 1. Boolean Laws and Theorems are illustrated as per the SOPs |
| * 1. Simplification rules for Boolean expressions are illustrated as per the SOPs |

**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**  ***May include but is not limited to:*** |
| 1. Electrical quantities and their units | * + E.M.F in volts   + Power in watts   + Energy in joules   + Resistance in ohms   + Current in amperes |
| 1. Types of electrical circuits | * + AC – Alternating Current * DC – Direct Current |
| 1. Types and operations of transistors | * + Types   + PNP   + NPN * Operations * Forward biasing * Reverse Biasing |
| 1. Types of memories | * Semi-conductor * Magnetic * Optical |
| 1. Classification of memories | * RAM * ROM |
| 1. Levels of memory storage | * Internal * Main * Online * Offline bulk |

**REQUIRED KNOWLEDGE AND UNDERSTANDING**

The individual needs to apply knowledge and understanding of:

* Electrical Components
* Electrical Quantities and units of measurement
* Electrical circuits
* Semiconductor theory
* Types of Computer memories
* Boolean algebra
* Logic gates

**FOUNDATION SKILLS**

The individual needs to apply the following foundation skills:

* Communications (verbal and written);
* Proficient in ICT
* Time management
* Problem solving
* Decision making
* 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. Identified electrical quantities and their S.I units as per electrical engineering standards   2. Identified types of electrical circuits as per electrical engineering standards   3. Identified electronic components as per electrical engineering standard   4. Memory storage as per technology used   5. Identified application of electronic components as per work place functions   6. Identified type and operations of transistors as per electronics principles   7. Identified logic gates as per the Digital Electronics principles   8. Developed logic circuits as per the standard procedures   9. Simplified logic circuits as per the standard procedures   10. Performed basic Boolean operations as per work procedures |
| 1. Resource Implications | The following resources should be provided:   * 1. Appropriately simulated environment where assessment can take place   2. Access to relevant work environment   3. Resources relevant to the proposed activities or tasks |
| 1. Methods of Assessment | Competency in this unit may be assessed through:   * 1. Practical   2. Projects   3. Third party reports   4. Portfolio of evidence evaluation   5. Written tests |
| 1. Context of Assessment | This Competency may be assessed individually in a workplace or simulated workplace |
| 1. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended. |

## APPLY DISCRETE MATHEMATICAL CONCEPTS

**UNIT CODE:** 0541 551 03A

**UNIT DESCRIPTION:**

This unit covers the competence to apply discrete mathematical concepts. It involves carrying out set theory operations, performing matrix operations, applying number system, applying logic gates, performing sequence and series operations, and demonstrating graph theory.

**ELEMENTS AND PERFORMANCE CRITERIA**

|  |  |
| --- | --- |
| **ELEMENT**  These describe the key outcomes which make up workplace functions | **PERFORMANCE CRITERIA**  These are assessable statements which specify the required level of performance for each of the elements  ***(Bold and italicized Types of matrices*** are applied as per ***terms are elaborated in the range****)* |
|
| 1. Carry out set theory operations | * 1. ***Characteristics of sets*** are identified as per workplace requirements. |
| * 1. Methods of set representation are applied as per workplace requirements. |
| * 1. Cardinality of a set is applied as per workplace requirements. |
| * 1. ***Types of sets*** are applied as per workplace requirements. |
| * 1. Venn Diagrams are applied as per workplace requirements. |
| * 1. ***Set Operations*** are applied as per workplace requirements |
| 1. Perform matrix operations | 2.1 Matrix order applied as per workplace requirements. |
| 2.2 Matrix operations are applied as per workplace requirements. |
| 2.3 Transpose of a matrix is applied as per workplace requirements. |
| 2.4 Properties of transpose of a matrix are identified as per workplace requirements. |
| 2.5 Adjoint of a square matrix identified as per workplace requirements. |
| 2.6 Inverse of a square matrix is identified as per workplace requirements. |
| 1. Apply number system | 1. ***Number systems*** are identified as per the mathematical standards |
| 1. Number system conversions are performed as per the conversion procedures |
| 1. Number system arithmetic is performed as per the arithmetic procedures. |
| 1. ***Binary codes*** are applied based on standard mathematics procedures |
| 1. Apply logic gates | 4.1 Logic gates are identified as per the Digital Electronics principles |
| 4.2 Logic circuits are illustrated as per the standard procedures |
| 4.3 Logic circuits are simplified as per the standard procedures |
| 1. Perform sequence and series operations | * 1. ***Key terms of sequences*** are applied as per workplace requirements. |
| * 1. Summation of a sequence is applied as per workplace requirements. |
| * 1. ***Arithmetic series*** is applied as per workplace requirements |
| * 1. Geometric series is applied as per workplace requirements. |
| 1. Demonstrate graph theory | * 1. ***Key Graph terminologies*** are applied as per workplace requirements |
| * 1. ***Types of graphs*** are applied as per workplace requirements |
| * 1. ***Representation of graphs*** are applied as per workplace requirements |
| * 1. Application of graphs are applied as per 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.

|  |  |
| --- | --- |
| **Variable** | **Range** |
| 1. Characteristics of sets may include but is not limited to: | * Elements * Size |
| 1. Methods of Set representation may include but is not limited to: | * Statement form * Tabular form * Set builder notation |
| 1. Types of sets may include but is not limited to: | * Finite Set * Infinite Set * Subset * Proper Subset * Universal Set * Empty or Null * Equal * Equivalent Set * Singleton Set or Unit Set * Overlapping Set * Disjoint Set |
| 1. Set operations may include but is not limited to: | * Set Union and Set Intersection * Set Difference/Relative Complement * Set Complement * Cartesian Product |
| 1. Types of matrices may include but is not limited to: | * Square * Symmetric * Skew-symmetric * Diagonal * Identity * Orthogonal * Involuntary |
| 1. Matrix operations may include but is not limited to: | * Sum of two matrices * Sum of a matrix and a scalar * Matrix subtraction * Product of two matrices * Product of a matrix and a vector |
| 1. Number system may include but is not limited to: | * Decimal * Binary * Octal * Hexadecimal |
| 1. Binary codes | * ASCII * BCD * Non weighted * Alphanumeric code * Error detection codes * Error correcting codes * Gray code, * Excess-3 * EBCDIC |
| 1. Key terms used in sequences may include but is not limited to: | * Sequence * Arithmetic Progression * Geometric Progression |
| 1. Key Graph Terminologies may include but is not limited to: | * Node * Edge * Adjacency * Vertex |
| 1. Types of graphs may include but is not limited to: | * Null * Simple * Multigraph * Directed graphs * Undirected |
| 1. Representations of graphs may include but is not limited to: | * Adjacency matrix * Adjacency list |

**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:

* Communications (verbal and written);
* Time management;
* Decision making;
* Research;
* Problem solving;

**Required knowledge**

The individual needs to demonstrate knowledge of:

* Set Theory
* Matrices
* Relations and Functions
* Recursion
* Sequence and Series
* Graph Theory

**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. Applied set operations as per workplace requirements.   2. Performed matrix operations.   3. Performed number system conversions as per the conversion procedures   4. Performed number system arithmetic as per the arithmetic procedures.   5. Applied binary codes based on standard mathematics procedures   6. Illustrated logic circuits as per the standard procedures   7. Simplified logic circuits as per the standard procedures   8. Applied arithmetic series as per workplace requirements.   9. Applied geometric series as per workplace requirements.   10. Applied application of graphs as per workplace requirements. |
| * + 1. Resource Implications | The following resources must be provided:   * 1. Access to relevant workplace where assessment can take place.   2. Appropriately simulated environment where assessment can take place.   3. Resources relevant to the proposed activity or tasks. |
| * + 1. Methods of Assessment | Competency may be assessed through:   1. Portfolio of evidence 2. Written tests 3. Interviews 4. Third party report 5. Practical assessment |
| * + 1. Context of Assessment | Competency may be assessed:   1. On-the-job 2. In a simulated work environment |
| * + 1. Guidance information for assessment | * 1. Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended. |

# CORE UNITS OF COMPETENCY

## DESIGN COMPUTER NETWORK

**UNIT CODE:** 0612 451 05A

**UNIT DESCRIPTION**

This unit covers the competencies required to design a computer network. It involves the following: perform computer network site survey, design computer network topology and document computer network design.

**ELEMENTS AND PERFORMANCE CRITERIA**

|  |  |
| --- | --- |
| **Elements**  *These describe the key outcomes which make up workplace functions* | **Performance Criteria**  *These are assessable statements which specify the required level of performance for each of the elements*  ***(Bold and italicized terms are elaborated in the range)*** |
|
| 1. Perform computer network site survey. | * 1. Current infrastructure is evaluated as per work procedure |
| * 1. ***Network needs*** are identified as per the organization's policy. |
| 1.3 Fundamental ***Network Design goals*** are determined as per work procedure. |
| 1.4 Computer network site layout is designed as per industry standards. |
| 1.5 ***Transmission media*** is identified as per IEEE 802.11, 802.3 |
| 1.6 ***E-waste*** is managed as per work standards. |
| 1.7 ***Green energy sources*** are identified as per work procedure |
| 1. Design Computer network topology. | * 1. Network Floor plan is designed as per work procedure. |
| * 1. Computer ***network active components*** are determined as per work procedure. |
| * 1. Network device locations are determined as per IEEE 802.11, 802.3 |
| * 1. ***Computer network topology*** is designed as per workprocedure. |
| 1. Document Computer network design. | * 1. Computer ***Network report*** is created as per organizational standards. |
| * 1. Network topology diagram is generated as per work procedure. |
| * 1. Device names, roles and IP addresses are documented as per work procedure. |

**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. **Network needs** may include but not limited to; | * + Communication   + Resource sharing   + Data sharing and collaboration   + Internet access   + Data back-up and recovery   + Security   + Fault tolerance and Redundancy |
| 1. **Network design goals** may include but not limited to; | * + Scalability   + Reliability   + Performance   + Security   + Flexibility   + QOS   + Accessibility |
| 1. ***Transmission media*** may include but not limited to; | * + Coaxial cable   + Fibre Optic   + Twisted pair   + Satellite   + Microwave |
| 1. ***E-waste*** may include but not limited to; | * + Obsolete servers   + Obsolete switches and routers   + Networking cables and connectors   + Obsolete computers and computer accessories |
| 1. ***Network*** ***active component***s may include but not limited to; | * + Router   + Switch   + Firewall |
| 1. ***Green energy sources*** may include but not limited to; | * + Renewable energy sources   + Energy efficient hardware   + Virtualization and Consolidation   + Energy aware routing   + Energy monitoring and reporting |
| 1. ***Computer network topology*** may include but not limited to; | * + Star   + Ring   + Bus   + Mesh   + Hybrid |
| 1. ***Network report*** may include but not limited to; | * + Network performance report   + Security report   + Inventory report   + Usage report   + Incident report |

**REQUIRED KNOWLEDGE AND SKILLS**

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

**Required knowledge**

* Network architecture
* Network components and devices
* Safety awareness
* Project management
* Environmental conservation
* Workplace safety and health

**Required skills**

* Computer Literacy
* Critical thinking
* Communication skills
* Problem-solving skills
* Analytical skills
* Creativity and innovation

**EVIDENCE GUIDE**

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

|  |  |
| --- | --- |
| 1. Critical aspects of competency | Assessment requires evidence that the candidate:   * 1. Performed Computer Network Site Survey as per work procedure   2. Designed computer network topology as per work procedure   3. Documented Computer network design as per work procedure |
| 1. Resource implications | The following resources should be provided:  2.1 Appropriately simulated environment where assessment can take place   * 1. Access to relevant work environment   2. Resources relevant to the proposed activities or tasks; including computers, media, routers, switches, ports etc. |
| 1. Methods of assessment | Competency in this unit may be assessed through:   * 1. Observation   2. Oral questioning   3. Portfolio of evidence   4. Interviews   5. Third party report   6. Practical assessment   7. Written tests |
| 1. Context of assessment | This Competency may be assessed in a workplace or a simulated workplace |
| 1. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended. |

## SETUP COMPUTER NETWORK

**UNIT CODE:** 0612 451 06A

**UNIT DESCRIPTION:**

This unit covers the competencies required to setup a computer network. It involves following: assemble computer network components, test computer network connectivity, document computer network configurations and conduct computer network user training.

**ELEMENTS AND PERFORMANCE CRITERIA**

|  |  |
| --- | --- |
| **Elements**  *These describe the key outcomes which make up workplace functions* | **Performance Criteria**  These are assessable statements which specify the required level of performance for each of the elements  ***(Bold and italicized terms are elaborated in the range)*** |
|
| 1. Assemble computer network components | 1.1. ***Network components*** are assembled as per IEEE 802.3 and IEEE 802.11 networking standards. |
| 1.2. ***Network components*** are connected according to IEEE 802.3 and IEEE 802.11 networking standards |
| 1.3. ***Network components*** and network devices are configured as per IEEE networking standards |
| 1. Test Computer network connectivity | 2.1. ***Network component*** performance is tested as per industry standards. |
| 2.2. Network performance is tested as per work procedure. |
| 2.3. ***Network testing*** report is generated as per work procedure |
| 2.4 ***Transmission Media*** are tested as per work procedure |
| 1. Document Computer network configurations | 3.1. ***Network component*** configurations are documented as per work procedure. |
| 3.2. Network data points are labeled as per work procedure |
| 3.3. Network topology design is labeled as per work procedure |
| 1. Conduct Computer Network user training | 4.1 Basic network navigation is conducted as per work procedure |
| 4.2 Common issues are Troubleshoot as per work procedure |
| 4.3 ***Data backup and recovery*** is performed as per work procedure |

**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. **Transmission media** may include but not limited to; | * + Fiber   + UTP   + Coaxial   + Radio   + STP |
| 1. **Network components** may include but not limited to; | * + Switches   + Routers   + Radio   + Servers   + Host |
| 1. **Network testing** may include but not limited to; | * Performance testing   + Functionality testing   + Security testing   + Resilience and Recovery Testing   + connectivity testing   + Media testing   + Bandwidth testing |
| 1. **Data backup and recovery** may include but not limited to; | * + Data identification and classification   + Backup strategy design   + Selection of backup solutions   + Implementation of backup procedures   + Regular backup execution   + Monitoring and verification |

**REQUIRED KNOWLEDGE AND SKILLS**

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

**Required knowledge**

* Network architecture
* Network components and devices
* Network types
* Safety Awareness
* Environmental conservation
* Workplace safety and health

**Required skills**

* Computer Literacy
* Critical thinking
* Communication skills
* Computational mathematics skills
* Problem-solving skills
* Analytical skills
* Creativity and innovation
* Network testing techniques
* Network security configuration
* Network configuration techniques

**EVIDENCE GUIDE**

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

|  |  |
| --- | --- |
| 1. Critical aspects of competency | Assessment requires evidence that the candidate:  1.1 Set up a computer network as per work procedure  1.2 Tested network connectivity as per work procedure  1.3 Documented network configuration as per work procedure  1.4 Conducted network user training as per work procedure |
| 1. Resource implications | The following resources should be provided:  2.1 Appropriately simulated environment where assessment can take place  2.2 Access to relevant work environment  2.3 Resources relevant to the proposed activities or tasks; including computers, media, routers, switches, ports etc |
| 1. Methods of assessment | Competency in this unit may be assessed through:  3.1 Observation  3.2 Oral questioning  3.3 Portfolio of evidence  3.4 Interviews  3.5 Third party report  3.6 Practical assessment  3.7 Written tests |
| 1. Context of assessment | This Competency may be assessed in a workplace or a simulated workplace |
| 1. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended. |

## INSTALL COMPUTER NETWORK SOFTWARE

**UNIT CODE:** 0612 451 07A

**UNIT DESCRIPTION**

This unit covers the competencies required to install computer network software. It involves the following: conduct network software simulation, perform computer network software installation, test computer network software, conduct computer network software user training and monitor computer network software performance.

**ELEMENTS AND PERFORMANCE CRITERIA**

|  |  |
| --- | --- |
| **Elements**  *These describe the key outcomes which make up workplace functions* | **Performance Criteria**  These are assessable statements *which specify the required level of performance for each of the elements*  ***(Bold and italicized terms are elaborated in the range)*** |
|
| 1. Conduct Network Software Simulation | * 1. ***Computer network software*** requirements are determined as per work procedure. |
| * 1. ***Computer network simulation Software*** is installed and configured as per software manual. |
| 1.3 ***Network Simulation activities*** are created as per work procedure. |
| 1. Perform Computer Network software installation | * 1. ***Network operating system*** is installed as per work procedure. |
| * 1. ***Network monitoring and management tools*** are installed as per work procedure. |
| * 1. Network monitoring tools are configured as per work procedure. |
| 1. Test Computer Network Software | * 1. ***Software testing*** is performed as per user requirements |
| * 1. Corrective measures are performed as per user requirements |
| * 1. ***Computer software*** functionality test report is generated as per work procedure |
| 4. Conduct Computer Network software user training | 4.1 User skill gap is determined as per work procedure |
| 4.2 User training manuals are prepared as per software manual. |
| 4.3 User training is conducted as per user training manual |
| 4.4 Training report is generated as per work procedure |
| 5. Monitor computer network software performance | * 1. ***Real-time monitoring*** is performed as per work procedure |
| * 1. ***Bandwidth and Throughput analysis is conducted as per work procedures*** |
| * 1. ***Network Alerts and notifications are monitored as per work procedures*** |

**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.

|  |  |
| --- | --- |
| 1. **Computer Network Software** may include but not limited to; | * + Operating systems   + Network protocols and services   + Network management software   + Remote desktop software   + Network backup and recovery software   + VoIP software |
| 1. **Computer network simulation Software** may include but not limited to; | * + Cisco Packet Tracer   + Graphical Network Simulator   + Wireshark |
| 1. **Network Simulation activities** may include but not limited to; | * + Packet tracer tracer exercises   + Wireshark analysis   + Cloud based simulations |
| 1. **Network Operating system** may include but not limited to; | * + Windows server   + Linux-based NOS   + Cisco IOS |
| 1. ***Network*** ***monitoring and management tools*** may include but not limited to; | * + Wireshark   + Nagios   + Zabbix   + Cisco Prime Infrastructure |
| 1. ***Software testing*** may include but not limited to; | * + Functional testing   + Performance testing   + Security testing   + Compatibility testing   + Scalability testing   + Usability testing |
| 1. ***Real-time monitoring*** may include but not limited to; | * + SNMP   + Packet sniffers   + Performance monitoring tools   + Flow-based analytics |
| 1. ***Network Alerts and Notification*** may include but not limited to; | * + Security alerts   + Performance alerts   + Hardware alerts   + Configuration alerts |

**REQUIRED KNOWLEDGE AND SKILLS**

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

**Required knowledge**

* Network components and devices
* Network security measures
* Network protocols
* Understanding Operating System
* Environmental conservation
* Workplace safety and health

**Required skills**

* Computer Literacy
* Critical thinking
* Problem-solving skills
* Analytical skills
* Technical proficiency
* Storage solutions
* Operating systems proficiency

**EVIDENCE GUIDE**

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

|  |  |
| --- | --- |
| 1. Critical aspects of competency | Assessment requires evidence that the candidate:   * 1. Conducted Network Software simulation as per work procedure   2. Performed Computer Network software installation as per work procedure   3. Tested Computer Network Software as per work procedure   4. Monitored network software performance as per work procedure |
| 1. Resource implications | The following resources should be provided:   * 1. Appropriately simulated environment where assessment can take place   2. Access to relevant work environment   3. Resources relevant to the proposed activities or tasks; including computers, media, routers, switches, ports etc. |
| 1. Methods of assessment | Competency in this unit may be assessed through:   * 1. Observation   2. Oral questioning   3. Portfolio of evidence   4. Interviews   5. Third party report   6. Practical assessment   7. Written tests |
| 1. Context of assessment | This Competency may be assessed in a workplace or a simulated workplace |
| 1. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended. |

## CONFIGURE COMPUTER NETWORK SECURITY

**UNIT CODE:** 0612 451 08A

**UNIT DESCRIPTION**

This unit covers the competencies required to configure computer network security. It involves the following: conduct computer network risk assessment, perform computer network segmentation, configure network firewall and conduct computer network security user training.

**ELEMENTS AND PERFORMANCE CRITERIA**

|  |  |
| --- | --- |
| **Elements**  These describe the key outcomes which make up workplace functions | **Performance Criteria**  These are assessable statements which specify the required level of performance for each of the elements  ***(Bold and italicized terms are elaborated in the range)*** |
|
| 1. Conduct computer network risk assessment | 1.1 Inventory of network components is taken as per work procedure |
| 1.2 ***Security Threats & Vulnerabilities*** are identified and prioritized as per work procedure. |
| 1.3 ***Security Controls*** are developed and implemented as per work procedure. |
| 1.4 Risk Assessment Report is documented as per work procedure. |
| 2. Perform computer network segmentation | 2.1 IP addressing scheme is performed as per IEEE 802.3 and IEEE 802.11. |
| 2.2 Network segmentation is determined as per the network design |
| 2.3 Network privileges are allocated according to the network configuration. |
| 3. Configure computer network firewall | 3.1 ***Firewall*** is secured as per work procedure |
| 3.2 ***Firewall*** zones and an IP address structure are established as per work procedure |
| 3.3 Access control lists are configured as per work procedure |
| 3.4 Login and firewall services are configured as per work procedure |
| 3.5 ***Firewall*** configuration is tested as per work policy |
| 3.6 ***Firewall*** is periodically Managed as per Work procedure |
| 4. Conduct Computer Network security user training | 4.1 Security awareness training is conducted as per work procedure |
| 4.2.Network security practices are implemented as per work procedure |
| 4.3.Incident response training is conducted as per work procedure |
| 4.4 Regular updates and refresher training is performed as per work procedure |
| 4.5.Compliance training is conducted as per work procedure |
| 4.6. Testing and simulation is performed as per work procedure. |

**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.

|  |  |
| --- | --- |
| 1. **Security threats and vulnerabilities** may include but not limited to; | * + Malware   + Phishing   + Denial of service   + Man in the middle attack |
| 1. **Security Controls** may include but not limited to; | * + Preventive   + Detective controls   + Corrective controls   + Deterrent controls   + Compensating controls |
| 1. **Firewall** may include but not limited to; | * + Hardware firewall   + Software firewall   + Cloud firewall   + Open source firewall |

**REQUIRED KNOWLEDGE AND SKILLS**

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

**Required knowledge**

* Network architecture
* Network components and devices
* Network security measures
* Network monitoring procedures
* Network testing procedures
* Understanding operating system
* Safety awareness
* Environmental conservation
* Workplace safety and health

**Required skills**

* Computer Literacy
* Critical thinking
* Communication skills
* Problem-solving skills
* Analytical skills
* Creativity and innovation
* Network testing techniques
* Network security configuration
* Network configuration techniques
* Network Monitoring
* Technical proficiency
* Project management
* Storage solutions
* Operating systems proficiency

**EVIDENCE GUIDE**

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

|  |  |
| --- | --- |
| 1. Critical aspects of competency | Assessment requires evidence that the candidate:   * 1. Conducted computer network risk assessment as per work procedure   2. Performed computer network segmentation as per work procedure   3. Configured network firewall as per work procedure   4. Conducted computer network security user training as per work procedure |
| 1. Resource implications | The following resources should be provided:  2.1 Appropriately simulated environment where assessment can take place  2.2 Access to relevant work environment  2.3 Resources relevant to the proposed activities or tasks; including computers, media, routers, switches, ports etc |
| 1. Methods of assessment | Competency in this unit may be assessed through:  3.1 Observation  3.2 Oral questioning  3.3 Portfolio of evidence  3.4 Interviews  3.5 Third party report  3.6 Practical assessment  3.7 Written tests |
| 1. Context of assessment | This Competency may be assessed in a workplace or a simulated workplace |
| 1. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended. |

## PERFORM COMPUTER NETWORK MAINTENANCE

**UNIT CODE:** 0612 451 09A

**UNIT DESCRIPTION:**

This unit covers the competencies required to perform computer network maintenance. It involves the following: analyze computer network performance, troubleshoot computer network components, perform computer network component repair and maintain computer network.

**ELEMENTS AND PERFORMANCE CRITERIA**

|  |  |
| --- | --- |
| **Elements**  *These describe the key outcomes which make up workplace functions* | **Performance Criteria**  *These are assessable statements which specify the required level of performance for each of the elements*  ***(Bold and italicized terms are elaborated in the range)*** |
|
| 1. Analyze Computer Network Performance | * 1. Network ***Traffic analysis*** is performed as per work procedure. |
| * 1. Network ***Bandwidth utilization*** ismonitored as per work procedure. |
| * 1. Computer network ***Latency measurement*** is conducted as per work procedure. |
| 1.4 Network ***Device performance monitoring*** is performed as per work procedure. |
| 1. Troubleshoot Computer Network Components | * 1. ***Basic electronic skills*** are applied as per industry standards |
| * 1. Network components and connections are tested as per industry standards |
| * 1. Network configuration is verified as per work procedure |
| * 1. Logs and error messages are reviewed as per work procedure |
| * 1. Report is generated as per the work procedure |
| 1. Perform Computer Network Component Repair | * 1. Faulty network component is Isolated as per work procedures |
| * 1. Problem-solving procedure is established as per work procedures |
| * 1. Maintenance tools are selected |
| * 1. Faults Identified are solved as per work procedure. |
| 3.5 Network component repair procedure is documented as per work procedure. |
| 1. Maintain computer network | 4.1 Hardware maintenance and regular software updates are performed |
| 4.2 Network monitoring and Performance optimization is implemented as per work procedure |
| 4.3 Backup and disaster recovery is performed as per work requirement |
| 4.4 Documentation and inventory are maintained |
| 4.5 Compliance and regulatory updates are conducted as per work procedure |

**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.

|  |  |
| --- | --- |
| 1. **Traffic analysis** may include but not limited to; | * + Bandwidth monitoring   + Packet inspection   + Performance optimization   + Forensic analysis   + Real-time monitoring and alerts |
| 1. **Bandwidth utilization** may include but not limited to; | * + Web browsing   + File downloads |
| 1. **Latency measurement** may include but not limited to; | * + Ping   + Traceroute   + Wireshark   + Network monitoring tools |
| 1. **Device performance monitoring** may include but not limited to; | * + Metrics tracking   + Alerting   + Real-time monitoring   + Security monitoring |
| 1. **Basic electronic Skills** may include but not limited to; | * + Cable termination and crimping   + Signal transmission   + Power Over Ethernet (POE)   + Basic implementation of Networking protocols |

**REQUIRED KNOWLEDGE AND SKILLS**

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

**Required knowledge**

* Network security measures
* Network testing procedures
* Safety awareness
* Environmental conservation
* Workplace safety and health
* Basics electronics

**Required skills**

* Critical thinking
* Communication skills
* Problem-solving skills
* Creativity and innovation
* Network security configuration
* Network configuration techniques
* Network Monitoring
* Technical proficiency
* Scripting and automation
* Operating systems proficiency
* Server Administration
* Basic programming

EVIDENCE GUIDE

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

|  |  |
| --- | --- |
| 1. Critical aspects of competency | Assessment requires evidence that the candidate:   * 1. Troubleshoot computer network components as per work procedure   2. Performed network component repair as per work procedure   3. Maintained a computer network as per work procedure |
| 1. Resource implications | The following resources should be provided:   * 1. Appropriately simulated environment where assessment can take place   2. Access to relevant work environment   3. Resources relevant to the proposed activities or tasks; including computers, media, routers, switches, ports etc. |
| 1. Methods of assessment | Competency in this unit may be assessed through:   * 1. Observation   2. Oral questioning   3. Portfolio of evidence   4. Interviews   5. Third party report   6. Practical assessment   7. Written tests |
| 1. Context of assessment | * 1. This Competency may be assessed in a workplace or a simulated workplace. |
| 1. Guidance information for assessment | * 1. Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended. |

## MONITOR COMPUTER NETWORK SECURITY

**UNIT CODE:** 0612 451 10A

**UNIT DESCRIPTION**

This unit covers the competencies required to monitor computer network security. It involves the following: conduct computer network security assessment, monitor computer network firewall activities and perform fundamental computer network segmentation.

**ELEMENTS AND PERFORMANCE CRITERIA**

|  |  |
| --- | --- |
| **Elements**  *These describe the key outcomes which make up workplace functions* | **Performance Criteria**  These are assessable statements *which specify the required level of performance for each of the elements*  ***(Bold and italicized terms are elaborated in the range)*** |
|
| 1. Conduct computer network security assessment | * 1. ***Network Security Threats & Vulnerabilities*** are identified and prioritized as per work procedure. |
| * 1. ***Network Security Controls*** are implemented as per work procedure. |
| 1.3 Network Risk Assessment Report is documented as per work procedure |
| 1. Monitor Computer Network Firewall activities | * 1. ***Firewall activities*** are monitored as per work procedures |
| * 1. Firewall updates are performed as per work procedures |
| * 1. Computer network traffic is monitored as per work procedure |
| 1. Perform fundamental Computer Network segmentation | * 1. ***IP addressing scheme*** is performed as per industry standards. |
| * 1. ***Network segmentation*** is determined as per the network design. |
| 3.3 ***Network privileges*** are allocated according to the network configuration |

**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.

|  |  |
| --- | --- |
| 1. **Network security Threats & Vulnerabilities** may include but not limited to; | * + Malware   + Phishing   + Man in the middle attack   + Denial of service attack   + SQL injection   + Weak authentication and authorization   + Physical security threats |
| 1. **Network Security Controls** may include but not limited to; | * + Firewalls   + Network segmentation   + Network monitoring and logging   + Authentication mechanisms |
| 1. **Firewall activities** may include but not limited to; | * + Packet filtering   + Logging and reporting   + Bandwidth management   + URL Filtering |
| 1. **IP addressing scheme** may include but not limited to; | * + Classful addressing   + Private IP addressing   + Public IP addressing |
| 1. **Network segmentation** may include but not limited to; | * + VLANs   + Subnetting   + Firewalls   + Physical segmentation |
| 1. **Network privileges** may include but not limited to; | * + Administrator privileges   + User privileges   + Read-only access   + Remote access privileges |

**REQUIRED KNOWLEDGE AND SKILLS**

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

**Required knowledge**

* Network architecture
* Network components and devices
* Network security measures
* Network monitoring procedures
* Network testing procedures
* Understanding operating system
* Safety awareness
* Environmental conservation
* Workplace safety and health

**Required skills**

* Computer Literacy
* Critical thinking
* Communication skills
* Problem-solving skills
* Analytical skills
* Creativity and innovation
* Network testing techniques
* Network security configuration
* Network configuration techniques
* Network Monitoring
* Technical proficiency
* Project management
* Operating systems proficiency

*EVIDENCE GUIDE*

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

|  |  |
| --- | --- |
| 1. *Critical aspects of competency* | Assessment requires evidence that the candidate:   * 1. Conducted computer network security assessment as per work procedure   2. Monitored network firewall activities as per work procedure   3. Performed fundamental Network Segmentation |
| 1. *Resource implications* | The following resources should be provided:   * 1. Appropriately simulated environment where assessment can take place   2. Access to relevant work environment   3. Resources relevant to the proposed activities or tasks; including computers, media, routers, switches, ports etc |
| 1. *Methods of assessment* | Competency in this unit may be assessed through:   * 1. Observation   2. Oral questioning   3. Portfolio of evidence   4. Interviews   5. Third party report   6. Practical assessment   7. Written tests |
| 1. Context of assessment | * 1. This Competency may be assessed in a workplace or a simulated workplace |
| 1. *Guidance information for assessment* | * 1. Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended. |

## PERFORM COMPUTER SYSTEM ADMINISTRATION

**UNIT CODE:** 0612 551 04A

**UNIT DESCRIPTION**

This unit covers the competencies required to perform computer system administration. It involves the following: manage computer systems, configure computer hardware and software and upgrade computer systems.

**ELEMENTS AND PERFORMANCE CRITERIA**

|  |  |
| --- | --- |
| **Elements**  These describe the key outcomes which make up workplace functions | **Performance Criteria**  These are assessable statements which specify the required level of performance for each of the elements  ***(Bold and italicized terms are elaborated in the range)*** |
|
| 1.Manage Computer Systems | 1.1 Incident response is conducted as per work procedure |
| 1.2 Documentation and reporting are compiled as per work procedure |
| 1.3 System User management is conducted as per the work procedure |
| 1.4 ***Computer System Resource*** allocation are allocated as per work procedures |
| 1.5 Disaster recovery planning is conducted as per organizational procedures |
| 1.6 Policy enforcement is adopted as per work requirement |
| 2. Configure Computer hardware and software | 2.1 Systems compatibility and requirements are identified as per user manual |
| 2.2 ***Tools*** and workspace is prepared as per work procedure. |
| 2.3 Computer software installation and configuration is performed as per user manual. |
| 2.4 System functionality is tested as per work procedure. |
| 2.5 Data migration is performed as per the work procedure. |
| 2.6 Systems Backup is set up as per work policy |
| 3. Upgrade Computer systems | 3.1 Computer systems to upgrade and update are identified as per work procedure |
| 3.2 Computer systems for update and upgrade are categorized as per work procedure |
| 3.3 Computer systems updates and upgrade are performed as per organizational procedure |
| 3.4 Upgrades and updates are documented as per work requirement |

**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.

|  |  |
| --- | --- |
| 1. ***Computer system resource*** may include but not limited to; | * + Motherboard   + ROM   + Device Drivers   + CPU |
| 1. ***Tools*** may include but not limited to; | * + Cable tester   + Crimping tool   + Stripper   + Fiber Splicer |

**REQUIRED KNOWLEDGE AND SKILLS**

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

**Required knowledge**

* Network architecture
* Network components and devices
* Network types
* Network security measures
* Network monitoring procedures
* Network protocols
* Network testing procedures
* Understanding operating system
* Safety awareness
* Environmental conservation
* Workplace safety and health
* Basics electronics

**Required skills**

* Computer Literacy
* Critical thinking
* Communication skills
* Computational mathematics skills
* Problem-solving skills
* Analytical skills
* Creativity and innovation
* Network testing techniques
* Network security configuration
* Network configuration techniques
* Network Monitoring
* Technical proficiency
* Scripting and automation
* Project management
* Cloud services management
* Storage solutions
* Operating systems proficiency
* Server Administration
* Virtualization
* Basic programming

**EVIDENCE GUIDE**

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

|  |  |
| --- | --- |
| 1. Critical aspects of competency | Assessment requires evidence that the candidate:   * Managed computer systems as per work procedure * Configured computer hardware and software as per work procedure * Upgraded computer systems as per work procedure |
| 1. Resource implications | The following resources should be provided:   * Appropriately simulated environment where assessment can take place * Access to relevant work environment * Resources relevant to the proposed activities or tasks; including computers, media, routers, switches, ports etc |
| 1. Methods of assessment | Competency in this unit may be assessed through:   * Observation * Oral questioning * Portfolio of evidence * Interviews * Third party report * Practical assessment * Written tests |
| 1. Context of assessment | This Competency may be assessed in a workplace or a simulated workplace |
| 1. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended. |

## PERFORM DATABASE ADMINISTRATION

**UNIT CODE:** 0612 551 05A

**UNIT DESCRIPTION:**

This unit covers the competencies required to perform database administration. It involves the following: install database, design database and backup database.

**ELEMENTS AND PERFORMANCE CRITERIA**

|  |  |
| --- | --- |
| **Elements**  These describe the key outcomes which make up workplace functions | **Performance Criteria**  These are assessable statements which specify the required level of performance for each of the elements ***(Bold and italicized terms are elaborated in the range)*** |
|
| 1. Install Database | 1.1 ***Database software*** is installed and configured to meet organizations needs |
| 1.2 Database system resource allocation is performed as per work procedure. |
| 1.3 ***Database testing*** is performed as per work procedure. |
| 1.4 Database storage and retrieval as per work procedure |
| 1.5 Performance monitoring and optimization is conducted as per work procedure |
| 1.6 Data migration is conducted as per work procedure |
| 1.7 Trouble shooting and problem resolution is conducted as per work procedure |
| 2.Design Database | 2.1 ***Database structure*** and organization is designed per organizations needs. |
| 2.2 Database ***security measures*** are performed to protect data as per work procedure |
| 2.3 Database storage is setup for easy of retrieval as per work procedure. |
| 3. Backup Database | 3.1 ***Database backup*** is Established as per work procedure. |
| 3.2 Database backup is maintained as per work procedure |
| 3.3 Database recovery procedures are set to safeguard data against loss or corruption as per work procedure. |

**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.

|  |  |
| --- | --- |
| 1. ***Database software*** may include but not limited to; | * Oracle * MySQL * PostgreSQL * MongoDB * Redis * MariaDB |
| 1. ***Database testing*** may include but not limited to; | * Microsoft SQL Server * DTM Data generator * HammerDB |
| 1. ***Database structure*** may include but not limited to; | * Flat table schema * Normalized schema * Star schema * Hierarchical schema * Document database schema |
| 1. ***Security measures*** may include but not limited to; | * Authentication * Encryption * Passwords |
| 1. ***Database backup*** may include but not limited to; | * Full backup * Incremental backup * Differential backup |

**REQUIRED KNOWLEDGE AND SKILLS**

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

**Required knowledge**

* Network architecture
* Network components and devices
* Network types
* Network security measures
* Network monitoring procedures
* Network protocols
* Network testing procedures
* Understanding operating system
* Safety awareness
* Environmental conservation
* Workplace safety and health
* Basics electronics

**Required skills**

* Computer Literacy
* Critical thinking
* Communication skills
* Computational mathematics skills
* Problem-solving skills
* Analytical skills
* Creativity and innovation
* Network testing techniques
* Network security configuration
* Network configuration techniques
* Network Monitoring
* Technical proficiency
* Scripting and automation
* Project management
* Cloud services management
* Storage solutions
* Operating systems proficiency
* Server Administration
* Virtualization
* Basic programming

**EVIDENCE GUIDE**

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

|  |  |
| --- | --- |
| 1. Critical aspects of competency | Assessment requires evidence that the candidate:   * + Installed Database as per work procedure   + Designed database as per work procedure   + Backed up database as per work procedure |
| 1. Resource implications | The following resources should be provided:   * Appropriately simulated environment where assessment can take place * Access to relevant work environment * Resources relevant to the proposed activities or tasks; including computers, media, routers, switches, ports etc |
| 1. Methods of assessment | Competency in this unit may be assessed through:   * Observation * Oral questioning * Portfolio of evidence * Interviews * Third party report * Practical assessment * Written tests |
| 1. Context of assessment | Competency may be assessed individually in the actual workplace and simulated setting of the actual work place |
| 1. Guidance information for assessment | Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended. |

## PERFORM SYSTEM VIRTUALIZATION

**UNIT CODE:** 0612 551 06A

**UNIT DESCRIPTION:**

This unit covers the competencies required to perform system virtualization. It involves the following: setup software based virtualization, setup virtual machines, allocate virtual resources, install virtual machine operating systems and manage storage.

**ELEMENTS AND PERFORMANCE CRITERIA**

|  |  |
| --- | --- |
| **Elements**  These describe the key outcomes which make up workplace functions | **Performance Criteria**  These are assessable statements which specify the required level of performance for each of the elements  ***(Bold and italicized terms are elaborated in the range)*** |
|
| 1. Setup Software Based Virtualization | 1.1. Hypervisor or ***virtual system*** machine monitor (VMM) is identified as per organizations needs |
| 1.2. ***Containerization*** is identified as per work procedure. |
| 1.3. Virtual Machine is setup as per work procedure. |
| 2. Setup virtual Machines | 2.1. Virtual machines are identified for individual configurations as per work procedure. |
| 2.2. Resource allocation is set up as per work procedure. |
| 2.3. Dockers are set up as per work procedure |
| 3. Allocate Virtual resources | 3.1. ***Virtual machine resources*** are identified as per organizations needs |
| 3.2. Docker Images are defined containing the necessary applications. |
| 3.3. ***Docker commands*** or container orchestration tools are identified as per virtual machine requirements. |
| 4. Install Virtual machine  Operating systems | 4.1 Virtual machine operating systems is installed and configured as per work procedure |
| 4.2 Virtual machine parameters are specified as per work procedure |
| 4.3 Virtual networking is configured as per work procedure |
| 5. Manage Virtual Storage | 5.1 Virtual storage is assigned for each virtual container as per work procedure |
| 5.2 Virtual disks or shared storage volumes are created as per work procedure |
| 5.3 Cloud storage is configured for remote storage and access as per work procedure. |
|  |  |

**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.

|  |  |
| --- | --- |
| 1. ***Virtual system*** may include but not limited to; | * + Virtualbox   + VMware   + Proxmox   + Openvx |
| 1. ***Containerization*** may include but not limited to; | * + Kubernetes   + Docker   + Docker swarm   + Apache mesos |
| 1. ***Virtual machine resources*** may include but not limited to; | * + RAM   + Storage space |
| 1. ***Docker commands*** may include but not limited to; | * + Docker build   + Docker pull   + Docker rm   + Docker commit |

**REQUIRED KNOWLEDGE AND SKILLS**

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

**Required knowledge**

* Network architecture
* Network components and devices
* Network types
* Network security measures
* Network monitoring procedures
* Network protocols
* Network testing procedures
* Understanding operating system
* Safety awareness
* Environmental conservation
* Workplace safety and health
* Basics electronics

**Required skills**

* Computer Literacy
* Critical thinking
* Communication skills
* Computational mathematics skills
* Problem-solving skills
* Analytical skills
* Creativity and innovation
* Network testing techniques
* Network security configuration
* Network configuration techniques
* Network Monitoring
* Technical proficiency
* Scripting and automation
* Project management
* Cloud services management
* Storage solutions
* Operating systems proficiency
* Server Administration
* Virtualization
* Basic programming

**EVIDENCE GUIDE**

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

|  |  |
| --- | --- |
| 1. Critical aspects of competency | Assessment requires evidence that the candidate:   * Set Up Software Based Virtualization as per work procedure per work procedure * Setup virtual Machines as per work procedure * Allocate Virtual resources per work procedure * Install Virtual machine Operating systems per work procedure * Managed Storage per work procedure |
| 1. Resource implications | The following resources should be provided:   * Appropriately simulated environment where assessment can take place * Access to relevant work environment * Resources relevant to the proposed activities or tasks; including computers, media, routers, switches, ports etc |
| 1. Methods of assessment | Competency in this unit may be assessed through:   * Observation * Oral questioning * Portfolio of evidence * Interviews * Third party report * Practical assessment * Written tests |
| 1. Context of assessment | 4.1 This Competency may be assessed in a workplace or a simulated workplace |
| 1. Guidance information for assessment | 5.1 Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended. |