THE REPUBLIC OF UGANDA
Ministry of Education and Sports

Business, Technical, Vocational Education and Training [BTVET] Sub sector Reform

Assessment and Training Package For SYSTEM ADMINISTRATOR

Qualification level: 1
Occupational Cluster: INFORMATION COMMUNICATION TECHNOLOGY

January 2022

Developed by:

Qualifications Standards Department
Directorate Of Industrial Training

Funded by:

Government of Uganda

DIRECTORATE OF INDUSTRIAL TRAINING

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Under BTVET Act, 2008, the functions of the Directorate of Industrial Training are:

(a) To identify the needs of the labour market for occupational competencies that fall under the UVQF.
(b) To regulate apprenticeship schemes.
(c) To foster and promote entrepreneurial values and skills, as an integral part of the UVQF.
(d) To secure adequate and sustainable financing for the efficient operations of the Directorate.
(e) To accredit training institutions or companies as assessment centres.
(f) To determine fees payable under the Act.
(g) To develop, apply, expand and improve the purposeful application of Uganda vocational qualifications defined in the UVQF.
(h) To assess and award Uganda Vocational Qualifications.
(i) To promote on-the-job training in industry for apprenticeship, traineeship and indenture training and for other training such as further skills training and upgrading.
(j) To prescribe the procedure for the making of training schemes.

Further to the above provisions, there is an established Uganda Vocational Qualifications Framework (UVQF), under part V of the BTVET Act, 2008. It is stated that:

The purpose of the UVQF is to;
(a) Define occupational standards in the world of work.
(b) Define assessment standards.
(c) Award vocational qualifications of learners who meet the set standards of different studies.
(d) Provide guidelines for modular training.

The UVQF shall follow principles of Competence Based Education and Training (CBET), which include:
(a) Flexible training or learning modules.
(b) Positive assessment and Certification.
(c) Assessment of Prior Learning.
(d) Recognition of formal and non-formal training.
(e) Self-paced or individual learning.
(f) Work place learning.

For award and recognition of certificates, the BTVET Act, 2008 provides that:

4.1 The Directorate and other examination boards established under the Act shall award certificates and diplomas for Business, Technical or Vocational Education and Training under the UVQF.

4.2 The Certificates and Diplomas to be awarded shall be in the form prescribed by the Minister on the recommendation of the Industrial Training Council.

4.3 The Certificates and Diplomas awarded under the Act shall be recognized in the Uganda education system and by the labour market.

Under the TVET Implementation Standards 2020, the proposed new mandate of the Directorate of Industrial Training shall be restricted to promoting the highest standards in the quality and efficiency of industrial training in the country and ensuring an adequate supply of properly trained manpower at all levels in the industry and the world of work.

The functions shall include:

(a) Regulating Industrial Training and Trainers.
(b) Developing Industrial Training Curricula.
(c) Harmonizing Curricula and Certificates of competence.
(d) Assessing Industrial Training.
(e) Development of Occupational Standards and Assessment and Training Packages (ATPs) for Trade Testing for the industry and world of work.
(f) Awarding certificates in that respect.

At operational level in the Directorate, the Qualification Standards Department performs development tasks related to concepts, procedures and instruments for establishment of the UVQF in close collaboration with both public and private stakeholders in vocational training.

In particular, the Department organizes and coordinates the development of Assessment and Training Packages for use in competence-based vocational training as well as standards-based assessment and certification.
The Directorate has therefore produced this Assessment and Training Package for use in implementing Competence-Based Education and Training mechanisms.

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Word from Permanent Secretary

The Ministry of Education and Sports (MoES) through the Directorate of Industrial Training Conducts Competence Based Assessment.

The advantages of CBET include improved access, equity and relevance of BTVET, reduced unit costs of training, and recognition of Prior Learning (or on-the-job- training), among others.

As the Ministry executes its obligation of ensuring quality in training standards, the public-private partnership is being strengthened to improve occupational competence of the country's workforce without gender bias.

Further, efforts to link Education and Training to the real world of work, the Ministry through the BTVET department set up the Uganda Vocational Qualification Framework (UVQF) Secretariat in 2004 which was main-streamed into DIT in 2008 as the Qualifications Standards Department.

To achieve the set-out targets in the reform process, the Directorate embarked on the anticipated UVQF design and development piloting its instruments and mechanisms in order to effectively enhance Competence-Based Education and Training (CBET) in Uganda.

To date, the Qualifications Standards Department of DIT has produced Assessment and Training Packages (ATP) for various occupations. Each ATP contains 3 parts namely:

1. Occupational/job Profile
2. Training modules and
3. Assessment instruments Banks

The ATP can be used by any training provider and/or those who wish to present themselves for Occupational Assessment and Certification.

Herewith, the Directorate of Industrial Training presents the "Assessment & Training Package (ATP)" for training, assessment and certification of **A SYSTEM ADMINISTRATOR- QUALIFICATION LEVEL I**

Finally, I thank all individuals, organizations and development partners who have contributed and/or participated in the review of this noble document.

Ketty Lamaro
Permanent Secretary

Executive Summary

This Assessment and Training Package is a Competence-Based Education and Training (CBET) tool and consists of three major parts:

0.1. PART I: The "Occupational Profile" (OP) of a SYSTEM ADMINISTRATOR.
This Occupational Profile, which was developed by System Administrators practicing in the world of work mirrors the duties, and tasks Tailors are expected to perform.

0.2. PART II: "Training Modules" in the form of guidelines to train **SYSTEM ADMINISTRATORS** both on the job as well as in training centers (or combinations of both venues of learning). The Training Modules herein have been developed basing on the Occupational Profile and hence are directly relevant for employment.

0.3. PART III: "Assessment Instruments" in the form of performance (Practical) and written (theory) test items that can and should be used to assess whether a person complies with the requirements of employment as a **SYSTEM ADMINISTRATOR**. These assessment-based instruments were developed by Job practitioners (System Administrators) based on the occupational profile and training modules.

0.4. While the Occupational Profile (OP) contained in PART I of this document provides the information on **WHAT a person is expected to do** competently in the world of work, the test items, - including performance, criteria- of PART III qualify the **HOW and/or HOW WELL a person must do the job**.

0.5. The modular format of the curriculum (PART II) allows learners to acquire job specific skills and knowledge (i.e., competencies) module by module. A single module can be accomplished within a relatively short duration of time allowing flexibility for learners to move directly into an entry level job, go for further modules or advance to higher levels of training. Modular courses allow more learners to access the training system because training centers as well as companies can accommodate more students in a given period of time.

In addition to improved access, equity and relevance of BTVET, the UVQF will also enable people who are convinced to have acquired competencies laid down in this ATP through prior training and on-the-job experience to access assessment and certification directly; be it on the basis of a single module, a group of modules or all modules pertaining to the occupation at once. This achievement will facilitate Recognition of Prior Learning (RPL).

0.6. The parts of this Assessment and Training Package were sequentially developed as follows:

i Part 1: Occupational Profile: ***January 2022***
ii Part 2: Training Modules: ***January 2022***
iii Part 3: Assessment Instruments: ***January 2022***

This ATP (or parts of it) may be periodically revised to match the dynamic trends in the occupation and hence issued in different versions.

Patrick Byakatonda
Ag. Director DIT

Acknowledgement

The Qualifications Standards Department of DIT wishes to sincerely acknowledge the valuable contributions to the development of this Assessment and Training Package by the following persons, Institutions and organizations:

- Members of the DIT Industrial Training Council;
- The Director and staff of DIT;
- Ministry of Education and Sports;
- The practitioners from the world of work;
- Information Technology Curriculum Specialists from NCDC
- Examination Specialists from UNEB
- Information Communication Technology Secondary school teachers
- The facilitators involved in guiding the review panel in their activities
- The Government of Uganda for financing the review of this ATP

Abbreviations and Acronyms

A&C	Assessment & Certification
ATP	Assessment & Training Packages
BTVET	Business, Technical and Vocational Education and Training
CBA	Competence Based Assessment
CBET	Competency Based Education and Training
DACUM	Develop a Curriculum
DIT	Directorate of Industrial Training
ITC	Industrial Training Council
GoU	Government of Uganda
LWA	Learning-working Assignment
MC	Modular Curriculum
MoES	Ministry of Education and Sports
OP	Occupational Profile
PEX	Practical Exercise
PTI	Performance (Practical) Test Item
QS	Qualification Standards
RPL	Recognition of Prior Learning
TIB	Test Item Bank
TVET	Technical and Vocational Education and Training
UVQ	Uganda Vocational Qualification
UVQF	Uganda Vocational Qualifications Framework
WTI	Written (Theory) Test Item

Key Definitions

Assessment	Assessment is the means by which evidence is gathered and judged to decide if an individual has met the stipulated assessment standards or not. Testing is a form of formal assessment.
Certification	Certification is a formal procedure to issue a certificate (qualification) to an individual that has demonstrated during formal assessment that he/she is competent to perform the tasks specified in the occupational profile.
Competence	Integration of skills, knowledge, attitudes, attributes and expertise in doing/ performing tasks in the world of work to a set standard.
Competency	(Occupational) competency is understood as the ability to perform tasks common to an occupation to a set standard.
CBET	Competence-based education and training means that programmes: 1. have content directly related to work 2. focus is on 'doing something well' 3. assessment is based upon industry work standards, and 4. curricula are developed in modular form
Duty	A Duty describes a large area of work in performance terms. A duty serves as a title for a cluster of related Tasks (see also: TASK).
Learning-Working Assignment (LWA)	LWA are simulated or real job situations / assignments that are suitable for learning in a training environment (e.g. "small projects"). In a working environment LWA are real work situations/assignments.
Modules	Modules are part(s) of a whole curriculum. Modules can be considered as "self-contained" partial qualifications which are described by learning outcomes or competencies and which can be assessed and certified individually.
Occupational Profile (OP)	An Occupational Profile is an overview of the duties and tasks a job incumbent is expected to perform competently in employment. Occupational Profiles developed by practitioners from the world of work enhance the relevance of training and learning to the requirements of the world of work.

Occupational Profiles define WHAT a person is supposed to do in performance terms. It also contains generic information regarding related knowledge and skills, attitudes/behaviour, tools, materials and equipment required to perform as well as trends/ concerns in the occupation.

Occupational profiles are the reference points for developing modular curricular and assessment standards

Qualification A qualification is a formal reward for demonstrating competence, based on formal assessment against set standards and provided to the individual in the form of a certificate specifying the nature of the competence.

Task Job TASKS represent the smallest unit of job activities with a meaningful outcome. Tasks result in a product, service, or decision. They represent an assignable unit of work and have a definite beginning and ending point. Tasks can be observed and measured. *(see also: Duty)*

1.0 ATP-PART I
Occupational Profile for SYSTEM ADMINISTRATOR

1.1 The OCCUPATIONAL PROFILE (OP) for "**SYSTEM ADMINISTRATOR**" below defines the ***Duties*** and ***Tasks*** a competent **SYSTEM ADMINISTRATOR** is expected to perform in the world of work (on the job) in Uganda and the East African region today.

1.2 Since it reflects the skill requirements of work life, the Occupational Profile is the reference document for the subsequent development of training modules and assessment instruments (test items) which are directly relevant to employment in Ugandan and the East African businesses and industries.

1.3 To ensure that the Occupational Profile is relevant for employment in Uganda and East Africa, the DIT used the method of "occupational/job profiling.

This approach involves the brainstorming of a panel of 7 to 12 competent job practitioners guided by trained and experienced facilitators. During a five-day workshop the panellists define the duties and tasks performed in employment, as well as the prerequisite skills, knowledge, attitudes, tools and equipment, and the future trends and concerns in the occupation/job.

1.4 The panellists, facilitators and coordinators who participated in developing this Occupational Profile for **a SYSTEM ADMNISTRATOR** are listed on the following page.

[1] The DACUM-method was used. DACUM is an acronym for 'Develop A Curriculum'

Expert Panel

Rose Nanteza
Database System Administrator-MoES
Moses Tuhame
NCDC Curriculum Specialist
Ggita Joseph
UNEB Representative
Nelson Byarugaba
Immaculate Heart Girls S.S
Catherine Nambazira
Mt. St. Mary's College Namagunga
Moses Kamugisha
St. Leo's College Kyegobe
Okao Richard Omara
Dr. Obote College Boroboro
Eric Sengonzi
Uganda Communications Commission
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Musamali Anthony
Chieftaincy of Military Intelligence
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Funded by
Government of Uganda

THE REPUBLIC OF UGANDA
Ministry of Education and Sports

Business, Technical, Vocational Education and Training (BTVET) Sub sector Reform

Occupational Profile

For a "SYSTEM ADMINISTRATOR"

Developed by: Directorate of Industrial Training (Qualifications Standards)

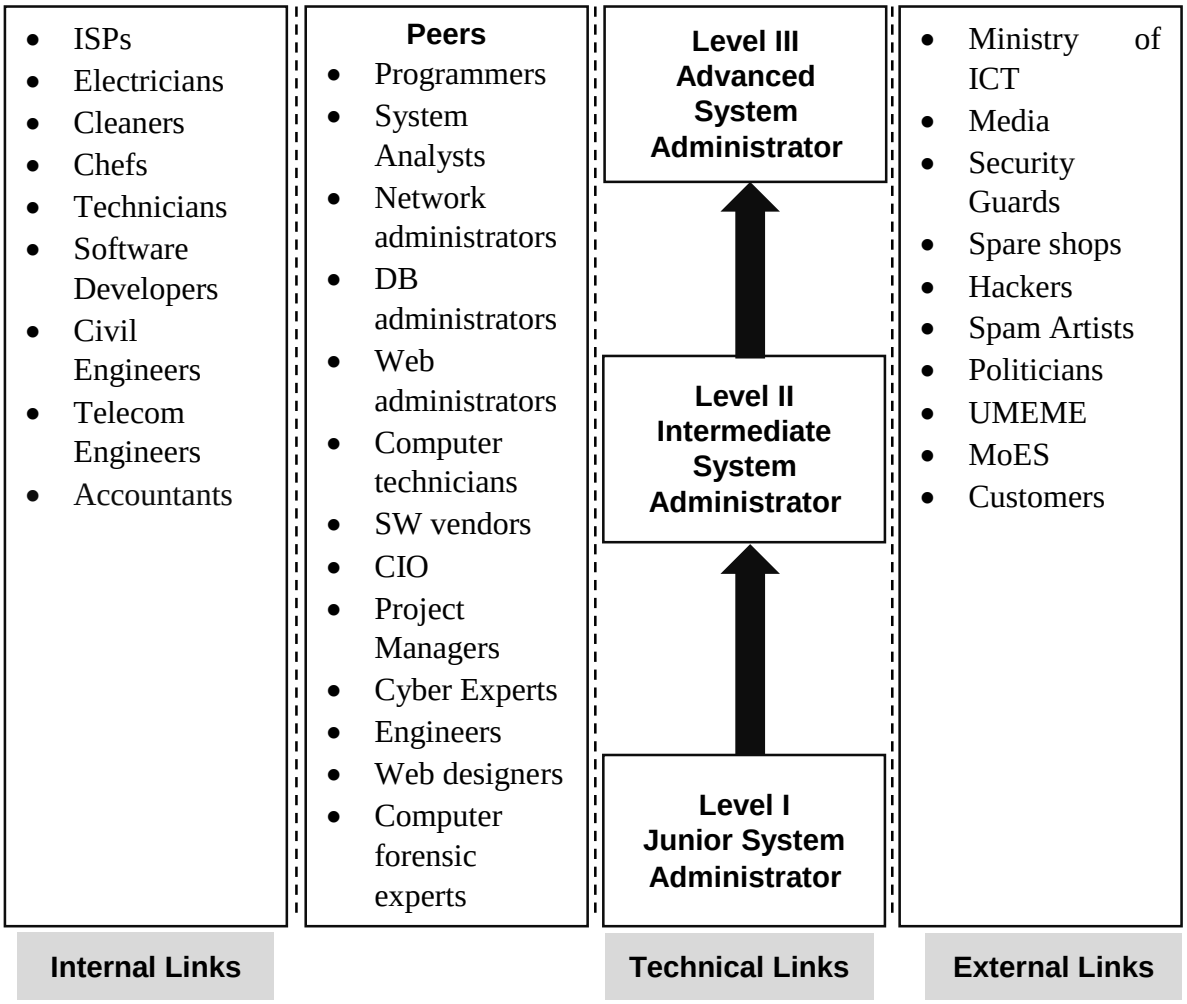
Dates of workshop: 17TH-21ST January 2022

NOMENCLATURE FOR THE OCCUPATION OF A SYSTEM ADMINISTRATOR

Definition of a System Administrator

A System Administrator is a person who manages computer systems and organizational ICT policies and how the systems operate within a multi-user organization/ environment.

JOB ORGANISATION CHART FOR A TILER



Descriptions for the levels in the occupation of a System Administrator

UVQ Level 1 Junior System Administrator: is a person who trains, offers IT support to end users and writes basic documentation**.**

UVQ Level 1 Intermediate System Administrator: is a person that configures, monitors, maintains computer systems, troubleshoots minimal malfunctions and implements organizational ICT policies.

UVQ Level 1 Advanced System Administrator: is a person who plans, designs, implements, modifies computer systems and develop organizational ICT policies.

Duties and Tasks

A. Rollout software	**A1.** Install software	**A2.** Configure software	**A3.** Integrate software
	A4. Secure software	**A5.** Monitor software	**A6.** Document software
	A7. Update software	**A8.** Train Users	**A9.** Decommission software

B. Administer IT Resources	**B1.** Setup networks	**B2.** Maintain networks	**B3.** Administer system security
	B4. Manage Users	**B5.** Manage databases	**B6.** Administer web services

C. Perform administrative tasks	**C1.** Pursue continuous professional development	**C2.** Audit systems	**C3.** Manage records
	C4. Appraise workers	**C5.** Develop organizational ICT policies and procedures	**C6.** Supervise work
	C7. Offer technical support	**C8.** Market services	**C9.** Recruit workers
	C10. Prepare reports	**C11.** Renumerate workers	

D. Plan Work	**D1.** Feasibility study	**D2.** Determine work location	**D3.** Prepare business plan
	D4. Prepare budget	**D5.** Prepare procurement plan	**D6.** Determine resources
	D7. Prepare work schedule		

E. Maintain Computer and System Security	**E1.** Backup data	**E2.** Clean computer systems and facilities	**E3.** Upgrade computer systems
	E4. Repair system faults	**E5.** Update system security	**E6.** Replace computer systems

F. Perform occupational safety, health and environmental protection practices	**F1.** Sensitize workers on occupational safety, health and environmental precaution issues	**F2.** Observe health and safety precautions	**F3.** Maintain hygiene and sanitation
	F4. Manage waste	**F5.** Interpret user manuals	**F6.** Display safety signs
	F7. Administer first aid	**F8.** Observe organizational ICT policies	**F9.** Ensure code of conduct
	F10. Report safety concerns		

Additional Information

General knowledge and skills	Attitudes, traits and behavior
• ICT terminologies • Basic Computer skills • Creativity/innovative • Project management • Written skills • Problem solving skills • Prioritize skills • Broad knowledge of different disciplines • Automation skills • Clear understanding of ICT concepts	• Commitment • Effective communication • Perseverance • Strategic vision • Multi tasker • Team player • Growth mindset • Integrality • Respect

Tools Materials and Equipment	
• Mobile/offsite system admin / mobile system admin tools • Putty • Notepad • Process explorer • S/W Repair Pack • Notepad • Internet • Laptop	• Wire shark • Microsoft message analyzer • Clone • Zilla • PowerShell ISE • 7-Ziper • Netcat, • DataDog • RSAT • WinRAR

Future trends and Concerns	
• Work Load • Cybersecurity • Skill gaps • Digital transformation/Divide • Cloud computing • Hiring Outsourcing retention • Cloud and XaaS are growing • Virtualization and VoIP	• Triple constraint Time scope cost • Bulky data • Career Growth • Over Ambition • Automation of tasks • Use of Cloud computing • Virtualization of tasks and activities

2.0 ATP-PART II
Training Modules for SYSTEM ADMINISTRATOR

2.1 A curriculum is a “guide /plan for teaching and learning” which provides a guide to teachers, instructors and learners. In the envisaged system of competence-based or outcome-oriented education and training (CBET), Curricula are no longer the benchmark against which assessment is conducted. It is rather the Occupational Profile that provides the benchmark for Curriculum development as well as assessment.

2.2 This modular format of the curriculum allows learners of a SYSTEM ADMINIISTRATOR to acquire job specific skills and knowledge (i.e., competencies) module by module. A single module can be accomplished within a relatively short duration of time allowing learners to move directly into an entry level job, do further modules and advance to higher levels of training. Modular courses allow more learners to access the training system because training centers, as well as companies can accommodate more students in a given period of time.

2.3 The modules were developed jointly by both instructors and job practitioners. They were developed using the Occupational Profile as a reference point and taking into account the specifications of training and learning outcomes.

2.4 The modules contain “Learning-Working Assignments” (LWAs) and related “Practical Exercises” (PEXs) as key elements.

LWAs are simulated or real job situations/assignments that are suitable for learning in a training environment (e.g., “small projects”). In a working environment, LWAs are real work situations.

PEXs are therefore sub-sets of an LWA.

2.5 In principle, and following the philosophy of Competence-Based Education and Training (CBET), the modules can be used as a guide for learning in a training Centre, at the workplace; or a combination of both.

WHO IS A SYSTEM ADMINISTRATOR- QUALIFICATION LEVEL I?

A System Administrator Level I is a person who trains, offers IT support to end users and writes basic IT documentation.

OVERVIEW OF MODULES FOR A SYTEM ADMINSTRATOR UVQ LEVEL 1

Code	Module Title	Average duration	
		Contact Hours	Days
UE/SA/M1.1	Establish Computer Systems	24	3
UE/SA/M1.2	Manage Users	16	2
UE/SA/M1.3	Manage Computer Systems	32	4
UE/SA/M1.4	Perform Entrepreneurship Tasks	40	5
Summary		**112 Hours**	**14 Days**

Note: Average duration is contact time but NOT calendar duration

It is assumed that:

- 1 day is equivalent to 8 hours of nominal learning and
- 1 month is equivalent to 160 hours of nominal learning.

Information given on the average duration of training should be understood as a guideline. Quick learners may need less time than indicated or vice versa.

At completion of a module, the leaner should be able to satisfactorily perform the included Learning Working Assignments, their Practical Exercises and attached theoretical instruction, as the minimum exposure.

Prior to summative assessment by recognized Agencies, the users of these Module Guides are encouraged to carefully consider continuous assessment using samples of (or similar) performance (practical) and written test items available in part 3 of this ATP for **SYSTEM ADMINISTRATOR**.

Code	**UE/SA/M1.1**
Module title	**Establish Computer Systems**
Qualification Level	1
Module purpose	By the end of this module, a trainee will be able to create and set up computer systems and peripherals.
Learning-Working Assignments (LWAs)	**LWA1/1:** Assemble computer System **LWA1/2:** Perform Software Installation **LWA1/3:** Set up networks **LWA1/4:** Share IT resources **LWA1/5:** Perform System Security **LWA1/6:** Perform Occupational Health, Safety and environmental protection practices ***Note:*** 1. *The learning exercises may be repeated till the trainee acquires a targeted competence.* 2. *The trainer is advised to deliver relevant theoretical instruction with demonstrations as required to perform each learning working assignment.*
Related Practical Exercises (PEXs)	**LWA1/1: Assemble computer System** PEX1.1: Prepare hardware PEX1.2: Connect peripherals PEX1.3: Power computer system PEX1.4: Boot computer system PEX1.5: Check functionality PEX1.6: Shut down computer
	LWA1/2: Perform Software Installation PEX2.1: Select software PEX2.2: Create the bootable devices PEX2.3: Install operating system PEX2.4: Install application software PEX2.5: Test-run application software PEX2.6: Monitor application software PEX2.7: Update application software PEX2.8: Uninstall application software
	LWA1/3: Set up networks PEX3.1: Set up network infrastructure plan PEX3.2: Terminate network cables PEX3.3: Trunk network cables PEX3.4: Connect network devices PEX3.5: Configure network devices

	LWA1/4: Share IT resources PEX4.1: Identify IT resources PEX4.2: Select IT resources PEX4.3: Configure IT resources PEX4.4: Test accessibility
	LWA1/5: Perform System Security PEX5.1: Maintain physical security PEX5.2: Protect hardware from damage PEX5.3: Protect data from unauthorized users
	LWA1/7: Perform Occupational Health, Safety and environmental protection practices PEX7.1: Perform fire fighting PEX7.2: Maintain sanitation and hygiene PEX7.3: Display Safety signs PEX7.4: Administer First aid PEX7.5: Gazette safety zones PEX7.6: Manage e-wastes
Occupational health and safety	Precautions, rules and regulations on occupational health, safety and environmental protection, included in the related knowledge listings as well as in test items should be observed and demonstrated during LWAs and PEXs.
Pre-requisite modules	
Related knowledge/ theory	*For occupational theory suggested for instruction/ demonstration, the trainer is not limited to the outlined below. In any case, related theory/ knowledge may be obtained from various recognized reference materials as appropriate:* • Knowledge on Network Designs and Infrastructure • Types of IT resources and network configurations • Computer Security and implementation practices • Computer maintenance practices • Green computing practices • Types of software and software requirements • Computer hardware and software Components • Types of spyware • Search Engines & web portals • Intranet and Extranet • Information and Data dissemination • Examples and types of malware

Average duration of learning	3 days (24hrs) of nominal learning suggested to include: • *1 day of occupational theory and* • *2 days of occupational practice*
Suggestions on organization of learning	The acquisition of competencies (skills, knowledge, attitudes) described in this module may take place at a training center or its equivalent provided all equipment and materials required for training are in place.
Assessment	Assessment to be conducted according to established regulations by recognized assessment body using related practical and written test items from Item Bank.
Required tools/ equipment/implements	Wireshack, System Monitor (Sysmon), AccessChk, Autoruns, Process Explorer, Process Monitor, 7-zip, Notepad ++, Process Hacker, PuTTy, PowerShell ISE, cloud infrastructure
Required materials and consumables	
Special notes	

Code	**UE/SA/M1.2**
Module title	**Manage Users**
Qualification Level	1
Module purpose	By the end of this module, a trainee will be able to train and offer technical support to computer users.
Learning-Working Assignments (LWAs)	**LWA2/1:** Train Users **LWA2/2:** Assign User rights **LWA2/3:** Provide technical support **LWA2/4:** Perform Occupational Health, Safety and environmental protection practices ***Note:*** *1. The learning exercises may be repeated till the trainee acquires a targeted competence.* *2. The trainer is advised to deliver relevant theoretical instruction with demonstrations as required to perform each learning working assignment.*
Related Practical Exercises (PEXs)	**LWA2/1: Train Users** PEX1.1: Identify training needs PEX1.2: Develop training plan PEX1.3: Prepare training resources PEX1.4: Conduct training PEX1.5: Evaluate training
	LWA2/2: Assign User rights PEX2.1: Create user accounts PEX2.2: Apply password policy
	LWA2/3: Provide technical support PEX3.1: Diagnose Faults PEX3.2: Plan fault resolution PEX3.3: Execute recovery plan PEX3.4: Assess user progress
	LWA2/4: Perform Occupational Health, Safety and environmental protection practices PEX4.1: Display safety signs PEX4.2: Sensitize users on Organizational ICT policies PEX4.3: Manage e-waste PEX4.4: Practice green computing
Occupational health and safety	Precautions, rules and regulations on occupational health, safety and environmental protection, included in the related knowledge listings as well as in test items should be observed and demonstrated during LWAs and PEXs.

Pre-requisite modules	
Related knowledge/ theory	*For occupational theory suggested for instruction/ demonstration, the trainer is not limited to the outlined below. In any case, related theory/ knowledge may be obtained from various recognized reference materials as appropriate:* • Benefits of digital literacy • Types of users • Model permissions • How to Check Permissions • How to Enforce Permissions • Django Admin and Model Permissions • Setup: A Custom User Admin • Prevent Update of Fields • Conditionally Prevent Update of Fields • Prevent Non-Super users From Granting Super user Rights • Grant Permissions Only Using Groups • Prevent Non-Super users From Editing Their Own Permissions • Override Permissions • Restrict Access to Custom Actions • Common viruses and evasion • Computer diagnosing • Software updates and installations • Types of Operating Systems • Hardware components and specifications • Storage expansion and management • Green computing practices • Types of malware and anti-malware tools • Knowledge on management IT tool
Average duration of learning	2 days (16hrs) of nominal learning suggested to include: • *1 day of occupational theory and* • *1 day of occupational practice*
Suggestions on organization of learning	The acquisition of competencies (skills, knowledge, attitudes) described in this module may take place at a training center or its equivalent provided all equipment and materials required for training are in place.

Assessment	Assessment to be conducted according to established regulations by recognized assessment body using related practical and written test items from Item Bank.
Required tools/ equipment/implements	Wireshack, System Monitor (Sysmon), AccessChk, Autoruns, Process Explorer, Process Monitor, 7-zip, Notepad ++, Process Hacker, PuTTy, PowerShell ISE, cloud infrastructure, docsheets, computers, server systems, peripheral devices
Required materials and consumables	
Special notes	

Code	**UE/SA/M1.3**
Module title	**Manage Computer Systems**
Qualification Level	1
Module purpose	By the end of this module, a trainee will be able to protect data and maintain computer systems.
Learning-Working Assignments (LWAs)	**LWA3/1:** Service computer system **LWA3/2:** Back up data **LWA3/3:** Swap Hardware **LWA3/4:** Upgrade hard ware **LWA3/5:** Perform Occupational Health, Safety and environmental protection practices <u>*Note:*</u> *1. The learning exercises may be repeated till the trainee acquires a targeted competence.* *2. The trainer is advised to deliver relevant theoretical instruction with demonstrations as required to perform each learning working assignment.*
Related Practical Exercises (PEXs)	**LWA3/1: Service computer system** PEX1.1: Diagnose faulty system PEX1.2: Clean computer system PEX1.3: Check Disk PEX1.4: Perform Routine Reboots PEX1.5: Perform data transfer PEX1.6: Test computer performance
	LWA3/2: Back up data PEX2.1: Schedule back up PEX2.2: Selecting Partitions PEX2.3: Compress files PEX2.4: Select backup type PEX2.5: Document backups
	LWA3/3: Swap Hardware PEX3.1: Determine faulty parts PEX3.2: Select replacement parts PEX3.3: Replace faulty parts PEX3.4: Test run Hard ware
	LWA3/4: Upgrade hard ware PEX4.1: Determine hard ware upgrade PEX4.2: Select upgrades PEX4.3: Install upgrades PEX4.4: Test run Hard ware upgrades

	LWA3/5: Perform Occupational Health, Safety and environmental protection practices PEX5.1: Display safety signs PEX5.2: Sensitize users on Organizational ICT policies PEX5.3: Manage e-waste PEX5.4: Perform renewable energy activities PEX5.5: Practice green computing
Occupational health and safety	Precautions, rules and regulations on occupational health, safety and environmental protection, included in the related knowledge listings as well as in test items should be observed and demonstrated during LWAs and PEXs.
Pre-requisite modules	
Related knowledge/ theory	*For occupational theory suggested for instruction/ demonstration, the trainer is not limited to the outlined below. In any case, related theory/ knowledge may be obtained from various recognized reference materials as appropriate:* • Types of computer faults and their solutions • Types of malware • Common viruses and evasion • Computer diagnosing • Software updates and installations • Types of Operating Systems • Hardware components and specifications • Storage expansion and management • Green computing practices • Types of malware and anti-malware tools • Knowledge on management IT tool • Types of IT resources and network configurations • Computer Security and implementation practices • Computer maintenance practices • Green computing practices • Types of software and software requirements • Computer hardware and software Components • Types of spyware • Search Engines & web portals • Backup tools • E-waste management
Average duration of learning	4 days (32Hrs) of nominal learning suggested to include: • *1 day of occupational theory and* • *3 days of occupational practice*

Suggestions on organization of learning	The acquisition of competencies (skills, knowledge, attitudes) described in this module may take place at a training center or its equivalent provided all equipment and materials required for training are in place.
Assessment	Assessment to be conducted according to established regulations by recognized assessment body using related practical and written test items from Item Bank.
Required tools/ equipment/implements	PPEs, anti-static mat, blower, SMD, screw driver kit, brush, digital multimetre, ATX Power Supply Tester, data-recovery software, HDD, flash disk, external HDD, flash disk, Tweezers, computer, filer, nozzle, twizer, pliers, cutter or blade, needle-nose pliers, wire cutters, wire strippers, crimpers
Required materials and consumables	cleaning cloth and form, solder paste, thermal paste, Water, thinner
Special notes	

Code	**UE/SA/M1.4**
Module title	**Perform Entrepreneurship Tasks**
Qualification Level	1
Module purpose	By the end of this module, a trainee will be able to protect data and maintain computer systems.
Learning-Working Assignments (LWAs)	**LWA4/1:** Prepare business plan **LWA4/2:** Perform administrative tasks **LWA4/3:** Manage records **LWA4/4:** Market enterprise **LWA4/5:** Operate Business **LWA4/6:** Perform Occupational Health, Safety and environmental protection practices <u>Note:</u> 1. *The learning exercises may be repeated till the trainee acquires a targeted competence.* 2. *The trainer is advised to deliver relevant theoretical instruction with demonstrations as required to perform each learning working assignment.*
Related Practical Exercises (PEXs)	**LWA4/1: Prepare business plan** PEX1.1: Prepare budget PEX1.2: Conduct market survey PEX1.3: Source for funds PEX1.4: Prepare work plan PEX1.5: Prepare procurement plan PEX1.6: Identify name
	LWA4/2: Perform administrative tasks PEX2.1: Recruit workers PEX2.2: Train workers PEX2.3: Appraise workers PEX2.4: Assign duties PEX2.5: Supervise workers PEX2.6: Provide welfare PEX2.7: Liaise with clients PEX2.8: Organize meetings
	LWA4/3: Manage records PEX3.1: Keep financial records PEX3.2: Add fields to new SQL database PEX3.3: Keep records of tools and equipment PEX3.4: Keep employees' database PEX3.5: Keep meeting minutes PEX3.6: Keep user training track records PEX3.7: Keep business plan records

	PEX3.8: Maintain EDI system
	LWA4/4: Operate Business PEX4.1: Procure equipment and tools PEX4.2: Legalize business PEX5.1: Establish workstation
	LWA4/5: Market enterprise PEX5.2: Brand enterprise PEX5.3: Price service packages PEX5.4: Advertise services PEX5.5: Offer services and packages
	LWA4/6: Perform Occupational Health, Safety and environmental protection practices PEX6.1: Train and sensitize workers on environmental issues PEX6.2: Construct sanitization facility PEX6.3: Provide cooking and cleaning facilities PEX6.4: Administer first aid PEX6.5: Perform green computing PEX6.6: Perform renewable energy activities
Occupational health and safety	Precautions, rules and regulations on occupational health, safety and environmental protection, included in the related knowledge listings as well as in test items should be observed and demonstrated during LWAs and PEXs.
Pre-requisite modules	
Related knowledge/ theory	*For occupational theory suggested for instruction/ demonstration, the trainer is not limited to the outlined below. In any case, related theory/ knowledge may be obtained from various recognized reference materials as appropriate:* • Types of records used by electricians • Definition of the different types of documents used by electricians • Communication skills • Components of different types of documents used by electricians • Methods of marketing IT SERVICES • Marketing techniques • Definition of information, communication and technology • Types of communications and technologies • Benefits of communication and technology

	• Procedure of starting an electrical service business • Types of businesses • Types of taxes payable • Procedure of developing a budget and its components • Importance of networking • Dealing with competition • Qualities of an entrepreneur • Characteristics of a successful business.
Average duration of learning	5 days (40Hrs) of nominal learning suggested to include: • *2 days of occupational theory and* • *3 days of occupational practice*
Suggestions on organization of learning	The acquisition of competencies (skills, knowledge, attitudes) described in this module may take place at a training center or its equivalent provided all equipment and materials required for training are in place.
Assessment	Assessment to be conducted according to established regulations by recognized assessment body using related practical and written test items from Item Bank.
Required tools/ equipment/implements	Calculator, cell phone/telephone set, stamp, computer, printer, photocopier, cabins, pigeon-holes, shelves, toolbox, power source
Required materials and consumables	Pens, pencils, papers, rulers, fliers, brochures, banners, posters, business cards, receipt book, invoice, books of records, proforma invoice, delivery note, stickers, signpost
Special notes	

3.0 ATP-PART III
Assessment Instruments for SYSTEM ADMINISTRATOR

3.1 Assessment of occupational competence is the procedure by which evidence is gathered and judged to decide if an individual (candidate) has met the stipulated assessment standards.

3.2 Assessment of occupational competence should comprise of both practical (Performance) testing and written (theory/knowledge) testing.

3.3 Based on the Occupational Profile and Training Modules, a combined panel of job practitioners and Instructors developed a substantial number of test items for assessing (practical) performance as well as items for assessing occupational knowledge (theory) all stored in an electronic Test Item Bank (TIB) at the Directorate of Industrial Training.

3.4 Performance (Practical)Test Items (PTI)are closely related to typical work situations in Ugandan business enterprises. They comprise of a test assignment for candidates and assessment criteria and/or scoring guides for assessors' use.

3.5 Written Test items (WTI) for written testing of occupational theory, (knowledge) are presented in different forms which include:

- short answer test items
- Multiple choice test items
- Matching test items.

These WTIs herein focus on functional understanding as well as trouble-shooting typically synonymous with the world of work.

3.6 Composition of assessment/test papers will always require good choices of different types of WTI in order to ensure the assessment of relevant occupational knowledge required of candidates to exhibit competence.

3.7 The test items contained in the Test Item Bank may be used for continuous/formative assessment during the process of training as well as for summative assessment of candidates who have acquired their competences non-formally or informally.

3.8 In this document, samples of test items for assessing both performance (practical) and occupational knowledge (theory) of a **SYSTEM ADMINISTRATOR** are included. A larger selection of test items can be obtained as electronic or printed copies from designated outlets.

3.9 Overview of test item samples included:

No.	Type of Test Item	Numbers included
1	Written (Theory)- Short Answer	4
2.	Written (Theory)- Multiple Choice	4
3.	Written (Theory)- Matching item- Generic	0
4.	Written (Theory)- Matching item (Work sequence)	1
5.	Performance (Practical) Test Items	2
	Total	**11**

WRITTEN TEST ITEMS (SAMPLES)

DIT/ QS	Test Item Database Written (Theory) Test Item- No. 1
Occupational Title:	System Administrator
Competence level:	1
Code no.	
Test Item type:	Short answer: √ Multiple choice: Matching item: Generic / Cause-Effect / Work-sequence
Complexity level:	C1
Date of OP:	January, 2022
Related module:	M1.1
Time allocation:	4 minutes
Marks allocation	4 marks

Test Item	**State any four system requirements for installing an operating system on a computer**.

Answer spaces	1. …… 2. ……... 3. …… 4. ……

Expected key (answers)	1. Processor speed 2. System memory 3. Free storage space 4. GPU 5. Audio hardware solution

DIT/ QS	Test Item Database Written (Theory) Test Item- No. 2
Occupational Title:	System Administrator
Competence level:	1
Code no.	
Test Item type:	Short answer: √ Multiple choice: Matching item: Generic / Cause-Effect / Work-sequence
Complexity level:	C2
Date of OP:	January, 2022
Related module:	M1.1
Time allocation:	2 minutes
Marks allocation	2 marks

Test Item	**Give two advantages of a server-based LAN over a peer-to-peer.**

Answer spaces	1. …… 2. ……

Expected key (answers)	1. Simplified file sharing 2. Improved data security 3. Central peripheral administration 4. Easy to scale 5. Easy sharing of resources

<table>
<tr><th>DIT/ QS</th><th colspan="4">Test Item Database
Written (Theory) Test Item- No. 3</th></tr>
<tr><td>Occupational Title:</td><td colspan="4">System Administrator</td></tr>
<tr><td>Competence level:</td><td colspan="4">1</td></tr>
<tr><td>Code no.</td><td colspan="4"></td></tr>
<tr><td>Test Item type:</td><td colspan="4"><table>
<tr><td>Short answer</td><td colspan="3">√</td></tr>
<tr><td>Multiple choice</td><td colspan="3"></td></tr>
<tr><td rowspan="2">Matching item</td><td>Generic</td><td>Cause-Effect</td><td>Work-sequence</td></tr>
<tr><td></td><td></td><td></td></tr>
</table></td></tr>
<tr><td>Complexity level:</td><td colspan="4">C2</td></tr>
<tr><td>Date of OP:</td><td colspan="4">January, 2022</td></tr>
<tr><td>Related module:</td><td colspan="4">M1.1</td></tr>
<tr><td>Time allocation:</td><td colspan="4">3 minutes</td></tr>
<tr><td>Marks allocation</td><td colspan="4">3 marks</td></tr>
</table>

Test Item	**Identify any three essential requirements you need to set up a small office network**

Answer spaces	1. …… 2. …… 3. ……

Expected key (answers)	1. Computer system 2. Network devices-hub. 3. Switch 4. Router 5. Modem 6. Firewall 7. Network connection 8. Network Interface card

DIT/ QS	Test Item Database Written (Theory) Test Item- No. 4
Occupational Title:	System Administrator
Competence level:	1
Code no.	
Test Item type:	Short answer: √ Multiple choice: Matching item: Generic / Cause-Effect / Work-sequence
Complexity level:	C2
Date of OP:	January, 2022
Related module:	M1.1
Time allocation:	3 minutes
Marks allocation	3 marks

Test Item	**Mention any 3 activities associated with physical security**

Answer spaces	1. …… 2. …… 3. ……

Expected key (answers)	1. Setting up CCTVs 2. Locking doors 3. Install burglar proofing 4. Access controls 5. Hire security personnel 6. Install device locks

DIT/ QS	**Test Item Database** **Written (Theory) Test Item- No. 5**
Occupational Title:	System Administrator
Competence level:	1
Code no.	
Test Item type:	Short answer: Multiple choice: √ Matching item: Generic / Cause-Effect / Work-sequence
Complexity level:	C2
Date of OP:	January 2022
Related modules:	M1.2
Time allocation:	2 Minutes
Marks allocation	2 marks

Test Item	_____ is composed of several computers connected together to a server to share resources and storage.

Distracters and correct answer	A. A Network B. A Grouping C. A Library D. An Integrated System

Expected key (answer)	D

DIT/ QS	**Test Item Database** **Written (Theory) Test Item- No. 6**
Occupational Title:	System Administrator
Competence level:	1
Code no.	
Test Item type:	Short answer: Multiple choice: √ Matching item: Generic / Cause-Effect / Work-sequence
Complexity level:	C2
Date of OP:	January 2022
Related modules:	M1.3
Time allocation:	2 Minutes
Marks allocation	2 marks

Test Item	What manages the software and hardware resources and provides services for the computer programs?

Distracters and correct answer	A. Random Access Memory B. Input Output System C. Operating system D. System Configuration File

Expected key (answer)	**C**

DIT/ QS	**Test Item Database** **Written (Theory) Test Item- No. 7**
Occupational Title:	System Administrator
Competence level:	1
Code no.	
Test Item type:	Short answer: Multiple choice: √ Matching item: Generic / Cause-Effect / Work-sequence
Complexity level:	C2
Date of OP:	January 2022
Related modules:	M1.3
Time allocation:	2 Minutes
Marks allocation	2 marks

Test Item	Which kind of hardware is used the most in the input phase of a computer-based information system?

Distracters and correct answer	A. Hard-disk B. Monitor C. Printer D. Keyboard

Expected key (answer)	D

DIT/ QS	**Test Item Database** **Written (Theory) Test Item- No. 8**
Occupational Title:	System Administrator
Competence level:	1
Code no.	
Test Item type:	Short answer: Multiple choice: √ Matching item: Generic / Cause-Effect / Work-sequence
Complexity level:	C3
Date of OP:	January 2022
Related modules:	M1.1
Time allocation:	4 Minutes
Marks allocation	4 marks

Test Item	A computer can be defined in different ways as discussed below. Select more than one for the best answers that define the computer. 1. Is an electronic device that processes data, converting it into information that is useful to people. 2. Controlled by programmed instructions that transform the data into meaningful information 3. Is a device that does work in a magical way that everyone doesn't understand. 4. Is a device that accepts input, processes it, stores data, and produces output

Distracters and correct answer	A. 1 & 3 B. 1,2, &4 C. 2&3 D. 2 & 4

Expected key (answer)	B

DIT/ QS	Test Item Database Written (Theory) Test Item- No. 9
Occupational Title:	System Administrator
Competence level:	1
Code no.	
Test Item type:	Short answer:
	Multiple choice:
	Matching item: Generic: ; Cause- Effect: ; Work-sequence: √
Complexity level:	C2
Date of OP:	January, 2022
Related modules:	M1.2
Time allocation:	3 minutes
Marks allocation	6 marks

Test Item	Order guidelines for trouble shooting done on a computer that has failed to boot. Match the trouble shooting procedure to its chronological order in column B

Column A (Troubleshooting procedure)	Column B (work steps) in wrong chronology order	
1.	A	Restore PC to factory setting
2.	B	Restore MBR
3.	C	Contact senior person
4.	D	Reset or correct hard disk boot consequences.
5.	E	Check hard disk
6.	F	Repair or reinstall OS

Key (answer)	**1:E, 2:B, 3:F, 4:D, 5:A, 6:C**

PERFORMANCE TEST ITEMS (SAMPLES)

DIT/ QS	Test Item Database Performance Test Item- No. 10
Occupational Title:	System Administrator
Competence level:	1
Code no.	
Test Item:	Install Office 2010
Complexity level:	P2
Date of OP:	January, 2022
Related modules:	M1.1
Related skills and knowledge:	• Hardware specifications • Types of software • Types of operating systems • Types of storage • Types of installation media • File Management
Required tools, Materials and Equipment:	Internet connection, computer, storage disks, installation media (CD, DVD, flash disks etc.), installation rights, software updates.
Time allocation:	3hrs
Preferred venue:	ICT Laboratory
Remarks for candidates	Candidates must identify themselves.
Remarks for assessors	Provide all the necessary tools, equipment and materials.

#	Assessment criteria	Scoring guide	Max Score	
			Process	Result
1	**Preparation before task**	Setup work area		2
		Connected computer to power source	2	
		No loose connection observed		1
		Powered on computer	2	
		LED indicators observed		1
2	**Evaluated hardware requirements for the software**	Checked network connectivity	2	
		Checked storage capacity	2	
		Checked operating system compatibility	2	
		Checked system memory	2	
		Checked processor speed	2	
		Compatibility confirmed		3
3	**Located/downloaded software files**	Appropriate installation media selected	1	
		Installation media connected to the computer	1	
		Installation files saved in an appropriate location	2	
		Files confirmed in the appropriate location		2
4	**Located executable file**	Setup file identified	1	
		Setup file run	1	
		Installation initiation confirmed		1
5	**Run Installation**	identified Dialog box instructions	1	
		followed Dialog box instructions	1	
		completed Installation process		2
6	**Tested software**	Office 2010 installation confirmed	1	
		Office 2010 application launched	1	
		Office 2010 application interface appeared		2
	TOTAL (y)	**(Process + Results)**	**24**	**14**
	Maximum score	$\frac{x}{y}$ **x 100**	$\frac{X}{38}$ **x 100**	

DIT/ QS	Test Item Database Performance Test Item- No. 11
Occupational Title:	System Administrator
Competence level:	1
Code no.	
Test Item:	Setup a computer system and create a user account with user rights
Complexity level:	P1
Date of OP:	January, 2022
Related modules:	M1.2, M1.3
Related skills and knowledge:	• Differentiate computer components • Connection of computer components • Booting of computer • Logging into a user account • Creating a user account • Assigning user rights
Required tools, Materials and Equipment:	Keyboard, mouse, monitor, system unit, power source, power cables, VGA cables, UPS
Time allocation:	1 hrs
Preferred venue:	ICT Laboratory
Remarks for candidates	Candidates must identify themselves. Handle computer components with care
Remarks for assessors	• Avail each candidate with a computer having an administrator account • Avail candidates with all listed tools, equipment and materials

#	Assessment criteria	Scoring guide	Max Score	
			Process	Result
1	**Identified computer components**	Setup work area	2	
		Arranged computer components	2	
		A connected computer system observed		4
2	**Booted a computer system**	Switched on power source	1	
		powered on UPS	2	
		started the computer	2	
		Logged in into an account	1	
3	**Created a user account**	Created username		2
		Assigned user rights		2
		User Account observed		2
	TOTAL (y)	**(Process + Results)**	**08**	**10**
	Maximum score	$\frac{x}{y}$ **x 100**	$\frac{X}{18}$ **x 100**	

4.0 ATP-PART IV
INFORMATION ON DEVELOPMENT PROCESS

4.1 Occupational Profile Development (January 2022)

The assessment and Training Package was exclusively developed by job practitioners who were working in the occupation of **SYSTEM ADMINISTRATOR.** The job expert panel, guided by UVQF facilitators developed the Occupational Profile that mirrors duties and tasks performed in the world of work and also provided additional generic information regarding the occupation.

4.2 Training Modules Development (January 2022)

Based on the Occupational Profile for SYSTEM ADMINISTRATOR of **January 2022**, Training Modules were developed by job practitioners, guided by UVQF Facilitators.

4.3 Test Item Development (January 2022)

Based on the Occupational Profile for SYSTEM ADMINISTRATOR of **January 2022**, and Training Modules, Test Items were developed by combined panels of instructors and job practitioners, guided by UVQF Facilitators.

4.4 Methodology

The rationale for the Assessment and Training Package review was to link Vocational Education and Training to the real world of work by bridging Occupational Standards to Training Standards through industry-led Standards-Based Assessment.

Active participation of both instructors and job practitioners' panels consolidated the development philosophy.

The panelists worked as teams in workshop settings complemented by off-workshop field research and literature review activities including international benchmarking.

4.5 Development Panel

The participating panel of Job Practitioners required for different stages of the assessment training package i.e., occupational profile, training modules, assessment instruments were constituted by members from the following organizations.

No.	NAME	INSTITUTION	CONTACT
1.	Rose Nanteza	MoES	0787111942
2.	Moses Tuhame	NCDC	0701344280
3.	Ggita Joseph	UNEB	0702992124/ 0786992124
4.	Nelson Byarugaba	Immaculate Heart Girls S.S	0774154321
5.	Catherine Nambazira	Mt. St. Mary's College Namagunga	0704298359/ 0784679898
6.	Moses Kamugisha	St. Leo's College Kyegobe	0782950880
7.	Okao Richard Omara	Dr. Obote College Boroboro	0754629429/ 0775002325
8.	Eric Sengonzi	Uganda Communications Commission	0702300718
9.	Edward Kakuru	State House	0741946095/ 0776984736
10.	Musamali Anthony	Chieftaincy of Military Intelligence	0757402909/ 0775402910
11.	Alfred Muligirwa	Uganda Revenue Authority	0772349410/ 0772142709

4.6 Facilitator team

This Assessment and Training Package was reviewed by a Facilitator team listed below:

1. **Team Leader** – Ms. Mukyala Ruth, Ag Deputy Director, DIT
2. **Facilitators (Occupational Profile Development) –** Mr. Kibira Benjamin Alex, Mr. Mwesigwa Isaac
3. **Facilitators (Training Modules Development) -** Mr. Kibira Benjamin Alex, Mr. Mwesigwa Isaac
4. **Facilitators (Test Item Development) -** Mr. Kibira Benjamin Alex, Mr. Mwesigwa Isaac
5. **Compiled** by Mr. Kibira Benjamin Alex, Ms. Aryatuha Ronnet, Ms. Eyoru Gladys Nicolette
6. **Edited** by Ms. Mukyala Ruth Ag. DD, DIT, Qualification Standards Dept. DIT
7. **Coordinated** by – Mr. Byakatonda Patrick, Ag. Director, DIT

4.7 Reference Time

The Assessment and Training Package was compiled in January 2022 and may be periodically revised to match the dynamic trends in the occupation and hence issued in different versions:

References:

- ICT Essential for Secondary Schools & Tertiary Institutions by Barbara Kayondo, 2017