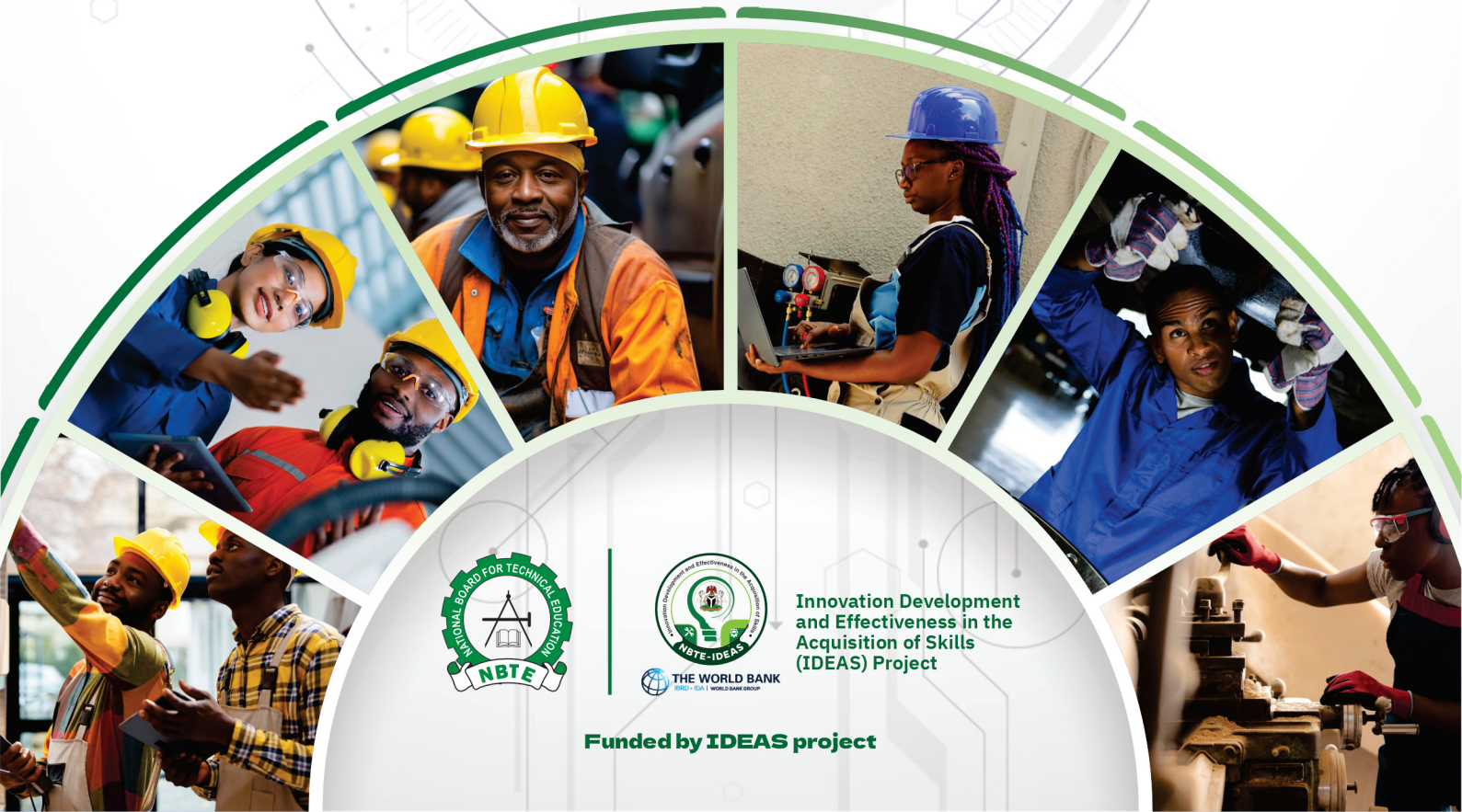
FEDERAL MINISTRY OF EDUCATION

# National Skills Qualifications FOR

# COMPUTER HARDWARE REPAIRS & MAINTENANCE

## LEVEL 1, 2 & 3

**February, 2025**



NATIONAL BOARD FOR TECHNICAL EDUCATION
NBTE

Innovation Development and Effectiveness in the Acquisition of Skills (IDEAS) Project

THE WORLD BANK

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**National Board for Technical Education**

Plot B, Bida Road, P.M.B. 2239, Kaduna, Nigeria

## NATIONAL SKILLS QUALIFICATION

# COMPUTER HARDWARE REPAIRS & MAINTENANCE

**FEBRUARY, 2025**

**Contents**

NATIONAL SKILLS QUALIFICATION

# COMPUTER HARDWARE REPAIRS & MAINTENANCE

# LEVEL 1

FEBRUARY, 2025

**NATIONAL SKILLS QUALIFICATION**

**NSQ LEVEL 1: COMPUTER HARDWARE REPAIRS AND MAINTENANCE**

# GENERAL INFORMATION

## QUALIFICATION PURPOSE

*This qualification focuses on equipping learners with the necessary skills for computer hardware maintenance and repair.*

## QUALIFICATION OBJECTIVES

**Upon completion of this qualification, learners should be able to:**

i. Observe Occupational Health and Safety (OHS) standards in hardware maintenance.

ii. Demonstrate effective communication skills and teamwork in IT environments.

iii. Identify, assemble, and disassemble computer hardware components safely and efficiently.

iv. Perform basic diagnostic and troubleshooting tasks using industry-standard tools to resolve common hardware faults.

v. Implement preventive maintenance strategies to enhance system longevity and efficiency.

vi. Apply cable management techniques and basic networking principles for IT infrastructure support.

**Mandatory Units**

| Unit No | Reference Number | NOS Title | Credit Value | Guided Learning Hours | Remark |
|---|---|---|---|---|---|
| Unit 001 | ICT/CMR/001/L1 | Occupational Health and Safety Procedures in Computer Operations and Maintenance | 3 | 30 | |
| Unit 002 | ICT/CMR/002/L1 | Effective Use of Communication Skills in Workplace | 3 | 30 | |
| Unit 003 | ICT/CMR/003/L1 | Basic Computer Operations and Maintenance | 3 | 30 | |
| Unit 004 | ICT/CMR/004/L1 | Basic Computer Maintenance Using Software Tools | 3 | 30 | |
| Unit 005 | ICT/CMR/005/L1 | Internal and External Components of Computers | 3 | 30 | |
| Unit 006 | ICT/CMR/006/L1 | Ethical Principles in Work Environment | 3 | 30 | |
| Unit 007 | ICT/CMR/007/L1 | Fundamentals and Applications of Basic Electronics | 3 | 30 | |
| | | **TOTAL** | **21** | **210** | |

**NOTE:**
**Mandatory Units**

*This is a **21-credit qualification**. Each credit corresponds to approximately **10 Guided Learning Hours (GLH)**. In addition to GLH, candidates are expected to engage in **independent learning** ranging from **50% to 150%** of the GLH. Consequently, the total learning hours per credit will be a minimum of **15 hours**, considering both guided and independent learning activities.*

**NATIONAL SKILLS QUALIFICATION**

**LEVEL 1:** *COMPUTER HARDWARE REPAIRS AND MAINTENANCE*

**Unit 1: OCCUPATIONAL HEALTH AND SAFETY**

**Unit Reference Number: ICT/CMR/001/L1**
**NSQ Level: 1**
**Credit Value: 2**
**Guided Learning Hours (GLH): 20**

**Unit Purpose:** *This unit helps learners develop awareness and the right attitude to follow occupational health and safety (OHS) procedures in the workplace.*

## Unit Assessment Requirements / Evidence Requirements:

Assessment must be done in a real workplace where learning and human development take place.

***Assessment methods include:***

- **Direct Observation (DO):** watching the learner perform tasks.
- **Question and Answer (QA):** asking questions to check understanding.
- **Witness Testimony (WT):** Statements from supervisors or trainers.
- **Assignments (ASS):** Written or practical tasks.

*Assessment methods may vary depending on the trade area.*

**UNIT 001:** OCCUPATIONAL HEALTH AND SAFETY

| **LEARNING OBJECTIVE (LO)**<br><br>**The learner will:** | | **PERFORMANCE CRITERIA**<br><br>**The learner can:** | **Evidence Type** | | | | | **Evidence Ref. Page No.** | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **LO 1: Understand Occupational Health and Safety in Computer Operations and Maintenance** | 1.1 | Explain occupational health and safety standards | | | | | | | | | |
| | 1.2 | Describe discomforts and disorders related to computer use, such as:<br>i. Back pain (lower and upper).<br>ii. Stiff neck.<br>iii. Sore shoulders.<br>iv. Arching wrists.<br>v. Dry eyes.<br>vi. Eyestrains and sore eyes.<br>vii. Glare.<br>viii. Musculoskeletal disorder | | | | | | | | | |
| | 1.3 | Explain how to ensure comfort and safety, including:<br>i. Proper screen distance<br>ii. Correct sitting posture<br>iii. Keyboard positioning.<br>iv. Adequate room lighting.<br>v. taking breaks and exercising.<br>vi. Using anti-glare screens | | | | | | | | | |
| | 1.4 | Identify health and safety risks in computer work, such as:<br><br>i. Electrostatic discharge<br>ii. Electric surges<br>iii. Electric shocks. | | | | | | | | | |
| | 1. | Use occupational health and safety equipment, including:<br><br>i. Anti-static wristbands<br>ii. Gloves<br>iii. Coveralls<br>iv. Boots<br>v. Fire extinguishers<br>vi. First aid kits | | | | | | | | | |
| | 1.6 | Explain important safety rules for computer maintenance and repairs. | | | | | | | | | |
| **LO 2: Understand Environmental Issues in Computer** | 2.1 | Explain environmental hazards related to computer operations. | | | | | | | | | |
| | 2.2 | Identify tools and equipment used to reduce environmental hazards. | | | | | | | | | |
| | 2.3 | Use tools and equipment to reduce environmental hazards. | | | | | | | | | |

| LEARNING OBJECTIVE (LO)<br><br>The learner will: | | PERFORMANCE CRITERIA<br><br>The learner can: | Evidence Type | | | | | Evidence Ref. Page No. | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Operations and Maintenance** | 2.4 | Identify risks related to water, air, and land pollution at work. | | | | | | | | | |
| | 2.5 | Describe ways to prevent environmental pollution. | | | | | | | | | |
| | 2.6 | Apply environmental protection methods in selected activities | | | | | | | | | |
| **LO 3: Demonstrate Personal Safety Practices in the Workplace** | 3.1 | Follow workplace safety rules. | | | | | | | | | |
| | 3.2 | Use personal protective equipment (PPE) correctly. | | | | | | | | | |
| | 3.3 | Identify different types of protective equipment (PPE). | | | | | | | | | |
| | 3.4 | Maintain a clean and safe work environment. | | | | | | | | | |
| | 3.5 | Recognize safety tags, signs, and symbols. | | | | | | | | | |
| **LO 4: Demonstrate First Aid Practices** | 4.1 | Identify first aid materials | | | | | | | | | |
| | 4.2 | Choose the right first aid materials for different situations. | | | | | | | | | |
| | 4.3 | Maintain first aid supplies in the workplace. | | | | | | | | | |
| | 4.4 | Perform first aid procedures when needed. | | | | | | | | | |

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| Learners Signature: | Date: |
| Assessors Signature: | Date: |
| IQA Signature (if sampled) | Date: |
| EQA Signature (if sampled) | Date: |

**NATIONAL SKILLS QUALIFICATION**

**LEVEL 1:** *COMPUTER HARDWARE REPAIRS AND MAINTENANCE*

**Unit 2: Effective Use of Communication Skills in Workplace**

**Unit Reference Number: ICT/CMR/002/L1**
**NSQ Level: 1**
**Credit Value: 2**
**Guided Learning Hours (GLH): 20**

**Unit Purpose:** *This unit introduces learners to basic communication skills that enhance their performance in the workplace.*

## Unit Assessment Requirements / Evidence Requirements:

Assessment must be done in a real workplace where learning and human development take place.

***Assessment methods include:***

- **Direct Observation (DO):** watching the learner perform tasks.
- **Question and Answer (QA):** asking questions to check understanding.
- **Witness Testimony (WT):** Statements from supervisors or trainers.
- **Assignments (ASS):** Written or practical tasks.

*Assessment methods may vary depending on the trade area.*

**UNIT 002:** Effective Use of Communication Skills in Workplace

| **LEARNING OBJECTIVE (LO)**<br><br>**The learner will:** | | **PERFORMANCE CRITERIA**<br><br>**The learner can:** | **Evidence Type** | | | | | **Evidence Reference Page No.** | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **LO 1: Understand Verbal and Non-verbal Communications** | 1.1 | Identify verbal means of communication | | | | | | | | | |
| | 1.2 | Identify non-verbal means of communication | | | | | | | | | |
| | 1.3 | Explain how to use simple verbal communication to pass on necessary information. | | | | | | | | | |
| | 1.4 | Explain how non-verbal communication (e.g., body language) can be used effectively. | | | | | | | | | |
| | 1.5 | Interpret symbols and signs appropriately | | | | | | | | | |
| **LO 2: Identify Sources of Information in a Work Environment** | 2.1 | Identify sources of information in an organizational work environment | | | | | | | | | |
| | 2.2 | Communicate appropriately with information sources. | | | | | | | | | |
| | 2.3 | Use various information flow systems in the workplace. | | | | | | | | | |
| | 2.4 | Apply information effectively to prevent work-related challenges. | | | | | | | | | |
| | 2.5 | Report findings in accordance to procedure in work environment | | | | | | | | | |
| **LO 3:**<br><br>**Use Various Communication Methods in a Work Environment** | 3.1 | Identify different communication equipment in the workplace. | | | | | | | | | |
| | 3.2 | Use workplace communication equipment effectively. | | | | | | | | | |
| | 3.3 | Deliver information correctly to the appropriate personnel. | | | | | | | | | |
| | 3.4 | Communicate effectively using symbols, signs, and codes. | | | | | | | | | |
| **LO 4: Understand the Basics of Pronunciation** | 4.1 | Identify vowel sounds | | | | | | | | | |
| | 4.2 | Explain diphthongs sounds | | | | | | | | | |
| | 4.3 | Distinguish between long and short vowel sounds. | | | | | | | | | |
| | 4.4 | Identify components/groups of sound that make the alphabets | | | | | | | | | |
| **LO 5: Demonstrate the Ability to Read** | 5.1 | Define the term "reading." | | | | | | | | | |
| | 5.2 | State reading techniques such as:<br>i. Browsing;<br>ii. Skimming;<br>iii. Scanning | | | | | | | | | |

| **LEARNING OBJECTIVE (LO)**<br><br>**The learner will:** | | **PERFORMANCE CRITERIA**<br><br>**The learner can:** | **Evidence Type** | | | | | **Evidence Reference Page No.** | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 5.3 | Explain the differences and purposes of each reading technique. | | | | | | | | | |
| | 5.4 | Practice the following:<br>i. Reading comprehension with a passage<br>ii. Paragraph reading and recall<br>i. Reading aloud<br>ii. Silent reading | | | | | | | | | |

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| Learners Signature: | Date: |
| Assessors Signature: | Date: |
| IQA Signature (if sampled) | Date: |
| EQA Signature (if sampled) | Date: |

**NATIONAL SKILLS QUALIFICATION**

**LEVEL 1:** *COMPUTER HARDWARE REPAIRS AND MAINTENANCE*

**Unit 3: Basic Computer Operations and Maintenance**

**Unit Reference Number: ICT/CMR/003/L1**
**NSQ Level: 1**
**Credit Value: 2**
**Guided Learning Hours (GLH): 20**

**Unit Purpose:** *This unit is to introduce learners to the basic skills needed to operate computers effectively and maintain them to minimize system downtimes in the work environment.*

## Unit Assessment Requirements / Evidence Requirements:

Assessment must be done in a real workplace where learning and human development take place.

***Assessment methods include:***

- **Direct Observation (DO):** watching the learner perform tasks.
- **Question and Answer (QA):** asking questions to check understanding.
- **Witness Testimony (WT):** Statements from supervisors or trainers.
- **Assignments (ASS):** Written or practical tasks.

*Assessment methods may vary depending on the trade area.*

**Unit 003: Basic Computer Operations and Maintenance**

| LEARNING OBJECTIVE (LO)<br><br>The learner will: | | PERFORMANCE CRITERIA<br><br>The learner can: | Evidence Type | | | | | Evidence Reference Page No. | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **LO 1: Understand the basics of personal computer systems** | 1.1 | Discuss the following:<br>i. Basics of computers;<br>ii. Applications of computers | | | | | | | | | |
| | 1.2 | Discuss the basic components of computers:<br>i. Input Devices;<br>ii. Output Devices;<br>iii. System unit;<br>iv. Memory and its types;<br>Storage Devices<br>v. Identify various I/O devices such as keyboard, mouse, scanner, printer, etc. | | | | | | | | | |
| | 1.3 | Identify the classes of personal computers:<br>i. Desktop;<br>ii. Laptop<br>iii. Mobile Devices | | | | | | | | | |
| | 1.4 | Explain the implications of computers on society | | | | | | | | | |
| | 1.5 | Explain how to operate a computer system | | | | | | | | | |
| | 1.6 | Carry out the activities involved in setting up a computer system | | | | | | | | | |
| | 1.7 | Explain how to connect, configure, and test I/O devices such as keyboard, mouse, scanners, printers, etc. | | | | | | | | | |
| | 1.8 | Explain the role of CPU, motherboard, RAM, and storage in system performance. | | | | | | | | | |
| LO2: **Understand Systems Software** | 2.1 | Define the operating system. | | | | | | | | | |
| | 2.2 | Differentiate between system software and application software | | | | | | | | | |
| | 2.3 | Identify the different operating systems.<br><br>i. recognize and name examples of different operating systems.<br><br>ii. Recognize other system software such as utility programs, antivirus, disk management tools, and backup software. | | | | | | | | | |
| | 2.4 | Use any File Manager to work with files and folders | | | | | | | | | |
| | 2.5 | Use Windows Help | | | | | | | | | |
| **LO 3: Understand Application Software** | 3.1 | Define application software and its examples | | | | | | | | | |
| | 3.2 | Differentiate between application software and system software | | | | | | | | | |

| LEARNING OBJECTIVE (LO)<br><br>The learner will: | | PERFORMANCE CRITERIA<br><br>The learner can: | Evidence Type | | | | | Evidence Reference Page No. | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 3.3 | Identify Windows-based application software such as Microsoft Office Suite and Google Suite. | | | | | | | | | |
| | 3.4 | Explain the basic features of each type of application software listed above | | | | | | | | | |
| | 3.5 | Identify icons, bars, and elements of Browsers | | | | | | | | | |
| **LO4: Differentiate the Booting Process of Computers** | 4.1 | Explain the term booting | | | | | | | | | |
| | 4.2 | Explain the types of booting:<br>i. Warm booting.<br>ii. Cold booting. | | | | | | | | | |
| | 4.3 | Explain the steps involved in booting Windows 8/11 and other operating systems | | | | | | | | | |
| | 4.4 | Outline the procedures of cold and warm booting | | | | | | | | | |
| **LO 5: Understand the Basic Principles of Computer Networking** | 4.1 | Describe of computer networking and its uses | | | | | | | | | |
| | 4.2 | Identify the uses of computer networks | | | | | | | | | |
| | 4.3 | State the classifications of networks:<br>i. Local Area Network (LAN)<br>ii. Metropolitan Area Network (MAN)<br>iii. Wide Area Network (WAN)<br>iv. Internet/World Wide Web | | | | | | | | | |
| | 4.4 | Explain the different types of networks listed in 4.2 | | | | | | | | | |
| | 4.5 | Identify the following components of a simple computer network:<br>i. Switches;<br>ii. Routers;<br>iii. Categories of Network Cables, e.g., CAT 5 and CAT-6e Ethernet cables, etc.<br>iv. Coaxial Cables<br>v. RJ-45 Connectors and BNC Connectors;<br>vi. Network Interface Cards.<br>Access points/Wireless routers | | | | | | | | | |
| | 4.5 | Explain the meaning of the following basic terms:<br>i. Topology.<br>ii. Bandwidth;<br>iii. Server.<br>iv. Clients | | | | | | | | | |
| **LO 6: Understand Classes of** | 5.1 | Explain hardware maintenance | | | | | | | | | |
| | 5.2 | Explain software maintenance | | | | | | | | | |
| | 5.3 | State types of computer software maintenance | | | | | | | | | |

| LEARNING OBJECTIVE (LO)<br><br>The learner will: | | PERFORMANCE CRITERIA<br><br>The learner can: | Evidence Type | | | | | Evidence Reference Page No. | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Maintenance and their Applications to Computers** | 5.4 | State types of computer hardware maintenance | | | | | | | | | |
| | 5.5 | Outline the benefits of carrying out preventive and corrective maintenance | | | | | | | | | |
| | 5.6 | Outline when to carry out preventive and corrective maintenance | | | | | | | | | |
| | 5.7 | State the characteristics of computer hardware maintenance | | | | | | | | | |
| | 5.8 | Perform the basic preventive maintenance on computers | | | | | | | | | |
| **LO 7: Use the Basic Tools Needed for Computer Hardware Maintenance and Repairs** | 6.1 | Identify the following computer hardware maintenance tools:<br>i. Soldering irons;<br>ii. Set of pliers;<br>iii. Cutters;<br>iv. Set of screw drivers;<br>Multi-meters, etc. | | | | | | | | | |
| | 6.2 | Explain the importance of tools in computer hardware maintenance and repairs | | | | | | | | | |
| | 6.3 | Outline the functions of the following hardware maintenance tools:<br>v. Soldering irons;<br>vi. Set of pliers;<br>vii. Cutters;<br>viii. Set of screwdrivers.<br>v. Multi-meters.<br>vi. Wire strips.<br>vii. Soldering stations.<br>viii. Set of Allen keys.<br>ix. Air blowers | | | | | | | | | |
| | 6.4 | Use tools listed in 6.3 above | | | | | | | | | |
| | 6.5 | Identify the appropriate equipment and facilities needed to set up a computer maintenance and repair workshop | | | | | | | | | |
| | 6.6 | Explain the risks involved in using incorrect tools to carry out maintenance and repairs | | | | | | | | | |

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| Learners Signature: | Date: |
| Assessors Signature: | Date: |
| IQA Signature (if sampled) | Date: |
| EQA Signature (if sampled) | Date: |

**NATIONAL SKILLS QUALIFICATION**

**LEVEL 1:** *COMPUTER HARDWARE REPAIRS AND MAINTENANCE*

**Unit 4: Basic Computer Maintenance Using Software Tools**

**Unit Reference Number: ICT/CMR/004/L1**
**NSQ Level: 1**
**Credit Value: 3**
**Guided Learning Hours: 30**

**Unit Purpose:** *This unit aims to equip learners with the necessary skills to maintain computers using software diagnostic tools.*

## Unit Assessment Requirements / Evidence Requirements:

Assessment must be done in a real workplace where learning and human development take place.

***Assessment methods include:***

- **Direct Observation (DO):** watching the learner perform tasks.
- **Question and Answer (QA):** asking questions to check understanding.
- **Witness Testimony (WT):** Statements from supervisors or trainers.
- **Assignments (ASS):** Written or practical tasks.

*Assessment methods may vary depending on the trade area.*

**Unit 004: Basic Computer Maintenance Using Software Tools**

| LEARNING OBJECTIVE (LO)<br><br>The learner will: | | PERFORMANCE CRITERIA<br><br>The learner can: | Evidence Type | | | | | Evidence Reference Page No. | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **LO 1: Apply the Basic Software Maintenance tools** | 1.1 | Use the Control Panel to adjust computer settings | | | | | | | | | |
| | 1.2 | Scan the computer to check for and repair errors | | | | | | | | | |
| | 1.3 | Perform defragmentation procedure for hard drive | | | | | | | | | |
| | 1.4 | Uninstall unwanted programs or apps | | | | | | | | | |
| | 1.5 | Use the Cleanup tool to remove unused files | | | | | | | | | |
| | 1.6 | Configure computers to run automatic maintenance schedules daily | | | | | | | | | |
| | 1.7 | Apply Windows Backup tool to store computer data using external hard disk USB memory sticks and cloud backup | | | | | | | | | |
| **LO 2: Perform installation of Anti-Virus Software and Internet Security** | 2.1 | Identify symptoms of computers infected with virus | | | | | | | | | |
| | 2.2 | Install Anti-Virus software and Internet Security such as AVG, Norton, Avast, McAfee, Kaspersky, etc. | | | | | | | | | |
| | 2.3 | Activate antivirus software and Internet Security | | | | | | | | | |
| | 2.4 | Scan computers using Anti-Virus software and Internet Security | | | | | | | | | |
| | 2.5 | Update antivirus software and Internet Security | | | | | | | | | |
| | | Renew expired antivirus software and Internet Security | | | | | | | | | |
| **LO3: Understand the Use Spyware and Malware Protection** | 3.1 | Identify the importance of Spyware and Malware definitions in computers | | | | | | | | | |
| | 3.2 | Use Spyware and Malware to scan computers | | | | | | | | | |
| | 3.3 | Update the Spyware and Malware | | | | | | | | | |
| | 3.4 | Perform actions on the detected harmful or unwanted items in computers | | | | | | | | | |
| | 3.5 | Explain how malware can affect computers' performance and security | | | | | | | | | |
| **LO 4: Demonstrate how to format** | 4.1 | State the aims of formatting hard drives of computers | | | | | | | | | |
| | 4.2 | Format hard drive of computer using formatting disk | | | | | | | | | |

| LEARNING OBJECTIVE (LO)<br><br>The learner will: | | PERFORMANCE CRITERIA<br><br>The learner can: | Evidence Type | | | | | Evidence Reference Page No. | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Hard drives of Computers** | 4.3 | Format a system using external hard-drive, basically for mini laptop | | | | | | | | | |
| | 4.4 | Demonstrate other disk management techniques such as partitioning and defragmentation for effective performance | | | | | | | | | |
| **LO 5: Install Personal Computer (PC) Drivers** | 5.1 | Explain device drivers | | | | | | | | | |
| | 5.2 | Identify missing device drivers | | | | | | | | | |
| | 5.3 | Install missing device drivers through the following methods:<br>I.Online;<br>ii. Offline | | | | | | | | | |
| | 5.4 | Test installed drivers and functionality of the components | | | | | | | | | |
| | 5.5 | Scan hardware changes after installation of drivers | | | | | | | | | |

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| Learners Signature: | Date: |
| Assessors Signature: | Date: |
| IQA Signature (if sampled) | Date: |
| EQA Signature (if sampled) | Date: |

**NATIONAL SKILLS QUALIFICATION**

**LEVEL 1:** *COMPUTER HARDWARE REPAIRS AND MAINTENANCE*

**Unit 5: Internal and External Components of Computers**

**Unit Reference Number: ICT/CMR/005/L1**
**NSQ Level: 1**
**Credit Value: 3**
**Guided Learning Hours: 30**

**Unit Purpose:** *This unit enables learners to identify, select, and evaluate the functionality of internal and external computer components.*

**Unit assessment requirements/ evidence requirements:**
Assessment must be carried out in a real workplace environment in which learning and human development are carried out.

## Unit Assessment Requirements / Evidence Requirements:

Assessment must be done in a real workplace where learning and human development take place.

***Assessment methods include:***

- **Direct Observation (DO):** watching the learner perform tasks.
- **Question and Answer (QA):** asking questions to check understanding.
- **Witness Testimony (WT):** Statements from supervisors or trainers.
- **Assignments (ASS):** Written or practical tasks.

*Assessment methods may vary depending on the trade area.*

**Unit 005: Internal and External Components of Computers**

| LEARNING OBJECTIVE (LO)<br><br>The learner will: | | PERFORMANCE CRITERIA<br><br>The learner can: | Evidence Type | | | | | Evidence Reference Page No. | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **LO 1: Understand various Computer Peripherals** | 1.1 | Define computer peripherals | | | | | | | | | |
| | 1.2 | Identify computer peripherals | | | | | | | | | |
| | 1.3 | Explain the main functions of computer peripherals | | | | | | | | | |
| | 1.4 | Identify computer peripherals that use Universal Serial Bus (USB) ports | | | | | | | | | |
| | 1.5 | Identify peripherals that use serial and parallel ports | | | | | | | | | |
| **LO 2: Identify the Internal Components of Computer Systems** | 2.1 | Identify the individual internal components of computers, such as:<br>i. Motherboard.<br>ii. Video Graphic Adapter (VGA) card;<br>iii. hard disks;<br>iv. power pack;<br>v. network interface cards;<br>vi. memory cards<br>vii. CPU | | | | | | | | | |
| | 2.2 | Explain the main functions of the internal components of computer systems as mentioned in 2.1 above | | | | | | | | | |
| | 2.3 | Demonstrate the relationship of each component in 2.1 to one another | | | | | | | | | |
| | 2.4 | Identify Serial Advanced Technology Attachment (SATA) and other internal cables of computers | | | | | | | | | |
| **LO 3: Identify Motherboards** | 3.1 | Identify different types of motherboards as essential component of computers | | | | | | | | | |
| | 3.2 | Identify the components of a motherboard | | | | | | | | | |
| | 3.3 | Explain the main functions of the motherboard components | | | | | | | | | |
| | 3.4 | Identify expansion slots and cards in the motherboards | | | | | | | | | |
| **LO4: Understand types of computer memories** | 4.1 | Define computer memories | | | | | | | | | |
| | 4.2 | Explain the uses of computer memories | | | | | | | | | |
| | 4.3 | Identify types of computer memories:<br>i. Random Access Memory (RAM)<br>ii. Read-only memory (ROM)<br>iii. Programmable Read Only Memory (PROM) | | | | | | | | | |
| | 4.4 | Explain the difference between volatile and non-volatile memories | | | | | | | | | |
| | 4.5 | Differentiate between the types of computer memory listed in 4.3 | | | | | | | | | |
| | 4.6 | Demonstrate how to enter BIOS setup | | | | | | | | | |

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| Learners Signature: | Date: |
| Assessors Signature: | Date: |
| IQA Signature (if sampled) | Date: |
| EQA Signature (if sampled) | Date: |

**NATIONAL SKILLS QUALIFICATION**

**LEVEL 1:** *COMPUTER HARDWARE REPAIRS AND MAINTENANCE*

**Unit 6: Ethical Principles in Work Environment**

**Unit Reference Number: ICT/CMR/006/L1**
**NSQ Level: 1**
**Credit Value: 3**
**Guided Learning Hours (GLH): 30**

**Unit Purpose:** *This unit educates learners on the importance of demonstrating ethical conduct and professional behavior in the workplace.*

## Unit Assessment Requirements / Evidence Requirements:

Assessment must be done in a real workplace where learning and human development take place.

***Assessment methods include:***

- **Direct Observation (DO):** watching the learner perform tasks.
- **Question and Answer (QA):** asking questions to check understanding.
- **Witness Testimony (WT):** Statements from supervisors or trainers.
- **Assignments (ASS):** Written or practical tasks.

*Assessment methods may vary depending on the trade area.*

**Unit 006: Ethical Principles in Work Environment**

| LEARNING OBJECTIVE (LO)<br><br>The learner will: | | PERFORMANCE CRITERIA<br><br>The learner can: | Evidence Type | | | | | Evidence Reference Page No. | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **LO 1: Understand Work Environment** | 1.1 | Identify the hierarchy within the working environment, customers, and suppliers in work environment | | | | | | | | | |
| | 1.2 | Explain the following obligations of employers and employees in an organization:<br>i. respect the views and decisions of other people;<br>ii. bring about good in all actions;<br>iii. harmless to others ;<br>iv. treat all people fairly and equally.<br>v. accountable for all actions;<br>vi. focus on details | | | | | | | | | |
| | 1.3 | Explain the importance of the following attributes at work.<br>i. punctuality;<br>ii. regularity;<br>iii. keeping obligations;<br>iv. being reliable;<br>v. meeting deadlines | | | | | | | | | |
| | 1.4 | Explain how staff should relate with their employers, superiors, and colleagues | | | | | | | | | |
| **LO 2: Demonstrate the Knowledge of Customer Relationship** | 2.1 | Explain the features of customers | | | | | | | | | |
| | 2.2 | Identify the challenges in customer relationship | | | | | | | | | |
| | 2.3 | Discuss good customer care | | | | | | | | | |
| | 2.4 | Manage customer relationship | | | | | | | | | |
| **LO 3: Observe Rules and Regulations in Workplace** | 3.1 | Explain rules and regulations in the workplace | | | | | | | | | |
| | 3.2 | Explain the general operational procedure in a computer hardware maintenance and repair workshop | | | | | | | | | |
| | 3.3 | Discuss dress code in a computer hardware maintenance and repair workshop | | | | | | | | | |

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| Learners Signature: | Date: |
| Assessors Signature: | Date: |
| IQA Signature (if sampled) | Date: |
| EQA Signature (if sampled) | Date: |

**NATIONAL SKILLS QUALIFICATION**

**LEVEL 1:** *COMPUTER HARDWARE REPAIRS AND MAINTENANCE*

**Unit 7: Fundamentals and Applications of Basic Electronics to Computer Hardware Maintenance and Repairs**

**Unit Reference Number: ICT/CMR/007/L1**
**NSQ Level: 1**
**Credit Value: 3**
**Guided Learning Hours: 30**

**Unit Purpose:** *This unit is designed to equip learners with the knowledge and skills to apply basic electronics in computer hardware repair and maintenance.*

## Unit Assessment Requirements / Evidence Requirements:

Assessment must be done in a real workplace where learning and human development take place.

***Assessment methods include:***

- **Direct Observation (DO):** watching the learner perform tasks.
- **Question and Answer (QA):** asking questions to check understanding.
- **Witness Testimony (WT):** Statements from supervisors or trainers.
- **Assignments (ASS):** Written or practical tasks.

*Assessment methods may vary depending on the trade area.*

**UNIT 007 Fundamentals and Applications of Basic Electronics to Computer Hardware Maintenance and Repairs**

| LEARNING OBJECTIVE (LO)<br><br>The learner will: | | PERFORMANCE CRITERIA<br><br>The learner can: | Evidence Type | | | | | Evidence Reference Page No. | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **LO 1:**<br>**Use of Basic Electronic tools in computer operations and maintenance.** | 1.1 | Identify Basic Electronic tools used in computer maintenance, such as;<br>I. Anti-Static Wrist Strap<br>II. Anti-Static Mats<br>III. Multimeter<br>IV. Voltage Tester<br>V. Screwdrivers<br>VI. Pliers<br>VII. Wire Cutters<br>VIII. Wire Strippers<br>IX. Power Supply Tester<br>X. POST Card<br>XI. USB Debugging Tool<br>XII. Thermal Paste<br>XIII. Cable Ties<br>XIV. Torx Driver | | | | | | | | | |
| | 1.2 | Categorize the Basic Electronics Tools in terms of usage, such as:<br>i. Safety Tools;<br>ii. Measuring Tools;<br>iii. Hand Tools;<br>iv. Power Tools;<br>v. Diagnostic Tools;<br>vi. Miscellaneous Tools | | | | | | | | | |
| | 1.3 | Explain the usage of Basic Electronics Tools in computer operation and maintenance. | | | | | | | | | |
| | 1.4 | Demonstrate the use of basic electronics tools in computer operation and maintenance. | | | | | | | | | |
| **LO 2:**<br>**Know Physical Quantities Related to Electric Circuits** | 2.1 | Explain Electronics and its importance to computer operation and maintenance | | | | | | | | | |
| | 2.2 | Explain the meaning of the following in the context of electric current:<br>I. Atoms;<br>II. Protons;<br>III. Neutrons;<br>vi. Electrons | | | | | | | | | |
| | 2.3 | Discuss the main characteristics of electronics:<br>i. Current; | | | | | | | | | |

| LEARNING OBJECTIVE (LO)<br><br>The learner will: | | PERFORMANCE CRITERIA<br><br>The learner can: | Evidence Type | | | | | Evidence Reference Page No. | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ii. Voltage;<br>iii. Resistance | | | | | | | | | |
| | 2.4 | State the SI units of the electrical quantities listed in 2.3 above | | | | | | | | | |
| | 2.5 | State the differences between Direct Current (DC) and Alternating Current (AC) voltage | | | | | | | | | |
| | 2.6 | Explain the four factors affecting the resistance of a conductor, namely:<br>i. Length;<br>ii. Cross-sectional area;<br>iii. Temperature;<br>iv. Resistivity | | | | | | | | | |
| | 2.7 | Draw simple diagrams to illustrate voltage, current, and resistance in electric circuits | | | | | | | | | |
| **LO 3: Understand the Concepts and Applications of Ohm's Law (V=IR) and Power ($P=I^2R$)** | 3.1 | State Ohm's law | | | | | | | | | |
| | 3.2 | Discuss the applications of Ohm's law in home and office equipment | | | | | | | | | |
| | 3.3 | Write the mathematical expression of Ohm's law | | | | | | | | | |
| | 3.4 | Explain the following DC circuits with the aid of simple diagrams:<br>i. Series;<br>ii. Parallel | | | | | | | | | |
| | 3.5 | Perform simple calculations on DC circuits using Ohm's laws | | | | | | | | | |
| | 3.6 | Define electrical power in relation with Ohm's Law (P=IR) | | | | | | | | | |
| | 3.7 | Explain the SI unit of power | | | | | | | | | |
| | 3.8 | Explain the importance of power | | | | | | | | | |
| | 3.9 | Perform simple power calculations in real-life situations | | | | | | | | | |
| **LO 4: Understand the basic electromagnetic principles due to current flowing through conductors** | 4.1 | Define the applications of electromagnetism | | | | | | | | | |
| | 4.2 | Explain the concept of electromagnetic induction | | | | | | | | | |
| | 4.3 | Explain alternating current (AC) voltage and how it is generated | | | | | | | | | |
| | 4.4 | Describe the two types of AC voltage using diagrams:<br>i. Single phase;<br>ii. Three-phase | | | | | | | | | |

| LEARNING OBJECTIVE (LO)<br><br>The learner will: | | PERFORMANCE CRITERIA<br><br>The learner can: | Evidence Type | | | | | Evidence Reference Page No. | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 4.5 | Explain the following terms associated with AC voltage using a sine wave:<br>i. Peak value;<br>ii. Peak-to-Peak value<br>iii. Instantaneous value<br>iv. Root Mean Square value | | | | | | | | | |
| **LO 5: Apply conductors, insulators, and semiconductors in computer hardware maintenance.** | 5.1 | Explain the meaning of the following:<br>I. Conductor;<br>II. Insulators;<br>III. Metals;<br>IV. Non-metals;<br>V. Alloys;<br>VI. Semiconductors | | | | | | | | | |
| | 5.2 | Identify the uses of metals and alloys in hardware maintenance and repair. | | | | | | | | | |
| | 5.3 | Identify uses of insulators in the Hardware Maintenance and repair trade | | | | | | | | | |
| | 5.4 | Identify uses of semiconductors in the Hardware Maintenance and repair trade | | | | | | | | | |
| **LO 6: Identify Instruments to Measure Physical Quantities** | 6.1 | State the basic physical quantities measured in computer operations and maintenance, such as:<br>i. Current<br>ii. Voltage<br>iii. Power<br>iv. Resistance<br>v. Energy<br>vi. Frequency/clock speed<br>vii. Inductance<br>viii. Capacitance | | | | | | | | | |
| | 6.2 | Explain the importance of 6.1 above | | | | | | | | | |
| | 6.3 | Identify the instruments that are used to measure the quantities listed in 6.1 | | | | | | | | | |

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| Learners Signature: | Date: |
| Assessors Signature: | Date: |
| IQA Signature (if sampled) | Date: |
| EQA Signature (if sampled) | Date: |

NATIONAL SKILLS QUALIFICATION

# COMPUTER HARDWARE REPAIRS & MAINTENANCE

# LEVEL 2

FEBRUARY, 2025

**NATIONAL SKILLS QUALIFICATION**

**NSQ LEVEL** 2
**COMPUTER HARDWARE REPAIRS AND MAINTENANCE**

# GENERAL INFORMATION

**QUALIFICATION PURPOSE**
The National Skills Qualification in *COMPUTER HARDWARE REPAIRS AND MAINTENANCE* is designed to advance the understanding of specialized skills in problem-solving towards career progression in a workplace environment.

**QUALIFICATION OBJECTIVES**
The learner should be able to: -

On completing of this qualification, learners should be able to:

- **i.** Apply Occupational Health and Safety Standards in hardware maintenance.
- **ii.** Demonstrate effective communication and teamwork skills in technical environments**.**
- **iii.** Assemble and disassemble computers for maintenance and upgrades.
- **iv.** Apply troubleshooting techniques to diagnose and repair faulty computer hardware**.**
- **v.** Conduct preventive and corrective maintenance on IT systems.
- **vi.** Implement basic networking and cable management for IT

**NATIONAL SKILLS QUALIFICATION**

**ICT SECTOR**

**NSQ LEVEL 2 COMPUTER HARDWARE REPAIRS AND MAINTENANCE**

## Mandatory Units

| S/No /Unit No | Reference Number | NOS Title | Credit Value | Guided Learning Hours | Remark |
|---|---|---|---|---|---|
| 1 | **ICT/CMR/001/L2** | Occupational Health and Safety in Workplace Environment | 2 | 20 | Mandatory |
| 2 | **ICT/CMR/002/L2** | Communication | 2 | 20 | Mandatory |
| 3 | **ICT/CMR/003/L2** | Teamwork | 2 | 20 | Mandatory |
| 4 | **ICT/CMR/004/L2** | Disassemble and Assemble Computers | 4 | 40 | Mandatory |
| 5 | **ICT/CMR/005/L2** | Faults Trace, Measurement, and troubleshooting in Computers | 4 | 40 | Mandatory |
| 6 | **ICT/CMR/006/L2** | General Maintenance and Repairs of Faulty Computers | 4 | 40 | Mandatory |
| 7 | **ICT/CMR/007/L2** | Management Of Computer Hardware Maintenance And Repairs | 40 | 40 | Mandatory |
| | | | 22 | 220 | |

## Optional Units

| S/No /Unit No | Reference Number | NOS Title | Credit Value | Guided Learning Hours | Remark |
|---|---|---|---|---|---|
| 8 | **ICT/CMR/008/L2** | Fundamentals of Basic Electronics to Computer Hardware Maintenance and Repairs | 3 | 30 | Mandatory |
| 9 | **ICT/CMR/009/L2** | Fundamental Principles of Using Printers, Photocopy Machines and Scanners | 3 | 30 | Mandatory |
| | | | 6 | 60 | |

**NOTE:** *This is a 23-credit qualification. To complete it, learners must earn 21 credits from mandatory units and 3 credits from optional units. Each credit equals approximately 10 Guided Learning Hours (GLH). Total learning hours include both GLH and independent learning, which typically ranges from 50% to 150% of GLH. As a result, the total learning hours per credit will be at least 15 hours.*

**NATIONAL SKILLS QUALIFICATION**

**LEVEL 2:** *COMPUTER HARDWARE REPAIRS & MAINTENANCE*

**Unit 1: OCCUPATIONAL HEALTH AND SAFETY**

**Unit Reference Number: ICT/CMR/001/L2**
**NSQ Level: 2**
**Credit Value: 2**
**Guided Learning Hours (GLH) : 20**

**Unit Purpose:** *This unit is designed to equip learners with the knowledge and skills to comply with health and safety standards in workplace environments and mitigate hazards.*

## Unit Assessment Requirements / Evidence Requirements:

Assessment must be done in a real workplace where learning and human development take place.

***Assessment methods include:***

- **Direct Observation (DO):** watching the learner perform tasks.
- **Question and Answer (QA):** asking questions to check understanding.
- **Witness Testimony (WT):** Statements from supervisors or trainers.
- **Assignments (ASS):** Written or practical tasks.

*Assessment methods may vary depending on the trade area.*

**UNIT 001: OCCUPATIONAL HEALTH AND SAFETY**

| LEARNING OBJECTIVE (LO) The learner will: | | PERFORMANCE CRITERIA The learner can: | Evidence Type | | | | | Evidence Ref. Page No. | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **LO 1: Understand Occupational Health and Safety Issues in Computer Operations and Maintenance** | 1.1 | Explain the importance of wearing clean and appropriate Personal Protective Equipment (PPE) in the workplace. | | | | | | | | | |
| | 1.2 | Know workplace safety complies with health and safety regulations and other relevant guidelines, including the Nigerian Factory Health and Safety Act of 2015. | | | | | | | | | |
| | 1.3 | Demonstrate treatment of cuts, grazes, and wounds. | | | | | | | | | |
| | 1.4 | Explain process of reporting accidents, illnesses and infections to appropriate Persons | | | | | | | | | |
| | 1.5 | Explain importance of maintaining good personal hygiene | | | | | | | | | |
| | 1.6 | Explain the Nigerian Factory Health and Safety Act of 2015 in relation to computer operations and maintenance. | | | | | | | | | |
| | 1.7 | Explain how to follow general rules on hygiene that must be observed | | | | | | | | | |
| | 1.8 | Identify appropriate Personal Protective Equipment (PPE), including head, foot, face, eye, hand, body, and regulatory protection. | | | | | | | | | |
| **LO 2: Observe Safety and Security in the Workplace** | 2.1 | Explain the importance of healthy, safe and secure workplaces | | | | | | | | | |
| | 2.2 | Explain how to report accidents or near misses to appropriate personnel | | | | | | | | | |
| | 2.3 | Carry out pollution control and waste disposal of organic and inorganic wastes | | | | | | | | | |
| **LO 3: Understand Hazards Identification and Mitigation Methods in a Workplace Environment** | 3.1 | Identify hazards or potential hazards | | | | | | | | | |
| | 3.2 | State where to find information about health and workplace hazards. | | | | | | | | | |
| | 3.3 | Describe the types of hazards in workplace that may occur and how to deal with them | | | | | | | | | |
| | 3.4 | Identify hazards that can be addressed personally in the workplace | | | | | | | | | |

| LEARNING OBJECTIVE (LO)<br><br>The learner will: | | PERFORMANCE CRITERIA<br><br>The learner can: | Evidence Type | | | | | Evidence Ref. Page No. | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 3.5 | Identify hazards that should be reported to the appropriate personnel. | | | | | | | | | |
| | 3.6 | Identify hazards that should be reported to the appropriate personnel. | | | | | | | | | |
| | 3.7 | Identify risk elements in your own workplace Environment | | | | | | | | | |
| | 3.8 | Describe organizational security procedures and why these are important | | | | | | | | | |
| | 3.9 | Follow procedures of raising awareness of Hazards | | | | | | | | | |
| **LO 4: Demonstrate Emergency Procedures in a workplace** | 4.1 | Describe types of emergencies in Workplace | | | | | | | | | |
| | 4.2 | Explain how to locate first-aid equipment and the registered first-aider in a Workplace | | | | | | | | | |
| | 4.3 | Describe organizational emergencies procedures, in particular fire, and how these should be followed | | | | | | | | | |
| | 4.4 | State possible causes for fire in workplace | | | | | | | | | |
| | 4.5 | Describe how to minimize the possibility of fire in workplace | | | | | | | | | |
| | 4.6 | Explain where to find alarms and how to set them off | | | | | | | | | |

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| **Learners Signature:** | **Date:** |
| **Assessors Signature:** | **Date:** |
| **IQA Signature (if sampled)** | **Date:** |
| **EQA Signature (if sampled)** | **Date:** |

**NATIONAL SKILLS QUALIFICATION**

**LEVEL 2:** *COMPUTER HARDWARE REPAIRS & MAINTENANCE*

**Unit 2: COMMUNICATIONS**

**Unit Reference Number: ICT/CMR/002/L2**
**NSQ Level: 2**
**Credit Value: 2**
**Guided Learning Hours (GLH) : 20**

**Unit Purpose:** *This unit is designed to equip learners with the knowledge and skills to effectively communicate technical information, ideas, and instructions.*

## Unit Assessment Requirements / Evidence Requirements:

Assessment must be done in a real workplace where learning and human development take place.

***Assessment methods include:***

- **Direct Observation (DO):** watching the learner perform tasks.
- **Question and Answer (QA):** asking questions to check understanding.
- **Witness Testimony (WT):** Statements from supervisors or trainers.
- **Assignments (ASS):** Written or practical tasks.

*Assessment methods may vary depending on the trade area.*

**UNIT 002:** Communications

| **LEARNING OBJECTIVE (LO)**<br><br>**The learner will:** | | **PERFORMANCE CRITERIA**<br><br>**The learner can:** | **Evidence Type** | | | | | **Evidence Ref. Page No.** | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **LO 1: Demonstrate how to communicate clearly and concisely.** | 1.1 | Describe the principles of Effective Communications in a Technical Manner | | | | | | | | | |
| | 1.2 | Explain how to effectively communicate with clients to understand their needs and provide technical support. | | | | | | | | | |
| | 1.3 | Explain how to clearly and concisely communicate technical information to colleagues, clients, and stakeholders. | | | | | | | | | |
| **LO 2: Understand the concept of Effective Listening** | 2.1 | Describe the key elements of effective listening :<br>I. Attention<br>II. Concentration<br>III. Comprehension<br>IV. Retention<br>V. Response | | | | | | | | | |
| | 2.2 | Explain the Barriers to Effective Listening;<br>I. Distractions<br>II. Biases<br>III. Language Barriers<br>IV. Emotional Barriers | | | | | | | | | |
| | 2.3 | Describe Benefits of Effective Listening;<br>I. Improved Communications<br>II. Enhanced Collaboration<br>III. Increased Customer<br>IV. Satisfaction<br>V. Reduced Errors | | | | | | | | | |
| **LO 3: Understand Effective Technical Documentation** | 3.1 | Identify how to document technical papers such as work orders, reports, and maintenance records accurately and clearly. | | | | | | | | | |
| | 3.2 | Inform on the creation of user manuals that are clear, concise, and easy to understand | | | | | | | | | |
| | 3.3 | Describe how to maintain accurate and up-to-date records of system configurations, maintenance activities, and troubleshooting procedures. | | | | | | | | | |
| | 3.4 | Explain how to create visual aids, such as diagrams and flowcharts, to support | | | | | | | | | |

| LEARNING OBJECTIVE (LO)<br><br>The learner will: | | PERFORMANCE CRITERIA<br><br>The learner can: | Evidence Type | | | | | Evidence Ref. Page No. | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | technical documentation | | | | | | | | | |
| | 3.5 | Describe how to revise and update Technical documentation regularly to reflect changes to the system or process | | | | | | | | | |
| | 3.6 | Describe how to ensure technical documentation complies with relevant industry standards and regulations. | | | | | | | | | |
| | 3.7 | Describe how to ensure technical documentation is accessible to the intended audience, including individuals with disabilities. | | | | | | | | | |
| **LO 4: Understand Emergency Procedures in workplace** | 4.1 | Describe how to communicate Effectively with colleagues and customers in face-to-face situations | | | | | | | | | |
| | 4.2 | Demonstrate effective communication with colleagues and customers over the phone and via video conferencing. | | | | | | | | | |
| | 4.3 | Explain how to communicate effectively with colleagues and customers via email and messaging platforms. | | | | | | | | | |
| | 4.4 | Explain how to effectively communicate technical information through presentations and reports. | | | | | | | | | |
| | 4.5 | Describe how to communicate feedback and escalate issues effectively to colleagues and customers for resolution. | | | | | | | | | |
| **LO 5: Understand the Assessment Criteria for Effective Communication** | 5.1 | Explain how to communicate the Accuracy and Clarity of technical information | | | | | | | | | |
| | 5.2 | Describe how to Adapt a communication style to suit different audiences and contexts | | | | | | | | | |
| | 5.3 | Explain the importance of timeliness in responding to messages | | | | | | | | | |
| **LO 6: Knowledge and Understanding** | 6.1 | Describe the Principles of Effective Communication | | | | | | | | | |
| | 6.2 | Explain the following Technical Terminology and Concepts;<br>I. CPU<br>II. MOTHERBOARD | | | | | | | | | |

| LEARNING OBJECTIVE (LO)<br><br>The learner will: | | PERFORMANCE CRITERIA<br><br>The learner can: | Evidence Type | | | | | Evidence Ref. Page No. | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | III. RAM<br>IV. HDD<br>V. GPU<br>VI. POST<br>VII. BOOT PROCESS<br>VIII. ERROR MESSAGES<br>IX. TROUBLESHOOTING | | | | | | | | | |
| | 6.4 | Describe the following Communication Protocols and etiquette:<br>I. Clear and concise language<br>II. Active listening<br>III. Respectful tone<br>IV. Timely responses<br>V. No-verbal communication<br>VI. Cultural sensitivity<br>VII. Avoid distractions<br>VIII. Use a clear subject line<br>IX. Use a formal greeting<br>X. Use proper formatting<br>XI. Proofread<br>XII. Answer promptly<br>XIII. Take messages | | | | | | | | | |
| | 6.5 | Explain the Importance of Effective Communication in Technical Environments | | | | | | | | | |

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| **Learners Signature:** | **Date:** |
| **Assessors Signature:** | **Date:** |
| **IQA Signature (if sampled)** | **Date:** |
| **EQA Signature (if sampled)** | **Date:** |

**NATIONAL SKILLS QUALIFICATION**

**LEVEL 2:** *COMPUTER HARDWARE REPAIRS & MAINTENANCE*

**Unit 3: TEAMWORK**

**Unit Reference Number: ICT/CMR/003/L2**
**NSQ Level: 2**
**Credit Value: 2**
**Guided Learning Hours (GLH): 20**

**Unit Purpose:** *This unit is designed to provide learners with the knowledge and skills to work collaboratively with others to achieve common goals and objectives.*

## Unit Assessment Requirements / Evidence Requirements:

Assessment must be done in a real workplace where learning and human development take place.

***Assessment methods include:***

- **Direct Observation (DO):** watching the learner perform tasks.
- **Question and Answer (QA):** asking questions to check understanding.
- **Witness Testimony (WT):** Statements from supervisors or trainers.
- **Assignments (ASS):** Written or practical tasks.

*Assessment methods may vary depending on the trade area.*

**UNIT 003: Teamwork**

| LEARNING OBJECTIVE (LO)<br><br>The learner will: | | PERFORMANCE CRITERIA<br><br>The learner can: | Evidence Type | | | | | Evidence Ref. Page No. | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **LO 1: Understand how to work collaboratively with others** | 1.1 | Demonstrate a positive and professional attitude by being respectful, punctual, and reliable | | | | | | | | | |
| | 1.2 | Explain how to use active listening skills, including maintaining eye contact and asking clarifying questions | | | | | | | | | |
| | 1.3 | Explain how to provide and receive feedback, including constructive criticism and positive reinforcement | | | | | | | | | |
| | 1.4 | Explain how to work effectively in a team to achieve common goals. | | | | | | | | | |
| | 1.5 | Describe how to manage conflicts by resolving issues constructively and respectfully. | | | | | | | | | |
| **LO 2: Understand how to Communicate Effectively with Team members** | 2.1 | Explain key communication skills, including information sharing and providing feedback within a team. | | | | | | | | | |
| | 2.2 | Demonstrate professionalism through a positive attitude, respect, punctuality, and reliability. | | | | | | | | | |
| **LO 3: Know how to Support Team members** | 3.1 | Describe problem-solving skills, including key inputs and ideas essential for team members. | | | | | | | | | |
| | 3.2 | Explain how to adapt to changing circumstances, such as shifting priorities, deadlines, and team dynamics. | | | | | | | | | |
| | 3.3 | Demonstrate Effective teamwork skills, including communication, collaboration, and conflict resolution | | | | | | | | | |
| **LO 4: Know how to respond to workplace emergence** | 4.1 | Describe types of emergencies in Workplace | | | | | | | | | |
| | 4.2 | Explain how to find first-aid equipment and identify the registered first-aider in the workplace. | | | | | | | | | |
| | 4.3 | Describe organizational emergency procedures, especially for fire incidents, and how to follow them correctly. | | | | | | | | | |
| | 4.4 | State possible causes for fire in workplace | | | | | | | | | |
| | 4.5 | Describe how to minimize possibility of | | | | | | | | | |

| LEARNING OBJECTIVE (LO)<br><br>The learner will: | | PERFORMANCE CRITERIA<br><br>The learner can: | Evidence Type | | | | | Evidence Ref. Page No. | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | fire in workplace | | | | | | | | | |
| | 4.6 | Explain where to find alarms and how to<br>set them off | | | | | | | | | |
| **LO 5:**<br>**Know how to Respect and Value Diversity, Equity, and Inclusivity in a Team** | 5.1 | Demonstrate an understanding of diverse cultures, customs, and values, and their applications in the workplace. | | | | | | | | | |
| | 5.2 | Describe how to build and maintain relationships with diverse stakeholders, including colleagues, clients, and community partners. | | | | | | | | | |
| | 5.3 | Explain how to navigate conflicts and difficult conversations in a respectful, empathetic, and inclusive manner. | | | | | | | | | |
| | 5.4 | Describe how to foster a culture of feedback and continuous learning where everyone feels valued, heard, and supported. | | | | | | | | | |
| | 5.5 | Explain how to advocate for diversity, equity, and inclusion in the workplace and the broader community. | | | | | | | | | |
| **LO 6:**<br>**Demonstrate how to coordinate team members effectively** | 6.1 | Explain team structures and the roles of each member. | | | | | | | | | |
| | 6.2 | Describe the effective use of communication methods, including verbal, written, and electronic communication. | | | | | | | | | |
| | 6.3 | Explain how conflict resolution and negotiation techniques are applied in a team setting. | | | | | | | | | |
| **LO 7:**<br>**Describe the Knowledge and Understanding of Teamwork** | 7.1 | Explain the principles of effective teamwork in a project or organization. | | | | | | | | | |
| | 7.2 | Describe the importance of communication, collaboration, and adaptability in team environments. | | | | | | | | | |
| | 7.3 | Explain strategies for managing conflict and building trust within teams. | | | | | | | | | |
| | 7.4 | Describe the benefits of diversity and inclusivity in team settings. | | | | | | | | | |
| **LO 8:**<br>**Describe the Evidence** | 8.1 | Describe teamwork in a simulated or real-work environment. | | | | | | | | | |
| | 8.2 | Explain how to obtain written or verbal | | | | | | | | | |

| LEARNING OBJECTIVE (LO)<br><br>The learner will: | | PERFORMANCE CRITERIA<br><br>The learner can: | Evidence Type | | | | | Evidence Ref. Page No. | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Requirements for Teamwork Engagements** | | feedback from team members or supervisors. | | | | | | | | | |
| | 8.3 | Describe how to document team meetings, decisions, and actions. | | | | | | | | | |
| | 8.4 | Explain how to reflect on personal teamwork skills and identify areas for improvement. | | | | | | | | | |

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| **Learners Signature:** | **Date:** |
| **Assessors Signature:** | **Date:** |
| **IQA Signature (if sampled)** | **Date:** |
| **EQA Signature (if sampled)** | **Date:** |

**NATIONAL SKILLS QUALIFICATION**

**LEVEL 2:** *COMPUTER HARDWARE REPAIRS AND MAINTENANCE*

**Unit 4: DISASSEMBLING AND ASSEMBLING OF COMPUTERS**

**Unit Reference Number: ICT/CMR/004/L2**
**NSQ Level: 2**
**Credit Value: 4**
**Guided Learning Hours: 40**

**Unit Purpose:** *This unit is designed to equip learners with knowledge and skills to disassemble and assemble computers safely and professionally during and after maintenance activities.*

## Unit Assessment Requirements / Evidence Requirements:

Assessment must be done in a real workplace where learning and human development take place.

***Assessment methods include:***

- **Direct Observation (DO):** watching the learner perform tasks.
- **Question and Answer (QA):** asking questions to check understanding.
- **Witness Testimony (WT):** Statements from supervisors or trainers.
- **Assignments (ASS):** Written or practical tasks.

*Assessment methods may vary depending on the trade area.*

**Unit 004: DISASSEMBLING AND ASSEMBLING OF COMPUTERS**

| LEARNING OBJECTIVE (LO)<br><br>The learner will: | | PERFORMANCE CRITERIA<br><br>The learner can: | Evidence Type | | | | | Evidence Ref. Page No. | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **LO 1: Disassemble and Assemble Personal Computers** | 1.1 | Demonstrate how to boot the computer systems (cold booting) | | | | | | | | | |
| | 1.2 | Demonstrate how to disconnect the external cables:<br>● Data cables;<br>● Power cables | | | | | | | | | |
| | 1.3 | Demonstrate how to discharge static electricity using anti-static straps or alternative methods. | | | | | | | | | |
| | 1.4 | Show how to remove the computer cover | | | | | | | | | |
| | 1.5 | Remove the following:<br>i. Front panel connection<br>ii. Hard disk drive<br>iii. SSD<br>iv. Power pack<br>v. Motherboard<br>vi. Cable connectors<br>vii. Microprocessor (CPU)<br>viii. Cooling fan and heat sink<br>ix. RAM | | | | | | | | | |
| | 1.6 | Connect the following computer components:<br>I. Motherboard<br>II. Microprocessor (CPU)<br>III. SSD<br>IV. Hard disk drive<br>V. Power pack<br>VI. Data cables<br>VII. RAM<br>VIII. Power cable<br>Computer cover | | | | | | | | | |
| **LO 2: Replace Motherboards and Processors** | 2.1 | Remove the old motherboard | | | | | | | | | |
| | 2.2 | Identify the matching characteristics of the new and old motherboards | | | | | | | | | |
| | 2.3 | Replace the old with the new Motherboard | | | | | | | | | |
| | 2.4 | Assess the performance of the old Processor | | | | | | | | | |
| | 2.5 | Replace the old with the new processor | | | | | | | | | |
| **LO 3:** | 3.1 | Identify the factors to consider when | | | | | | | | | |

| LEARNING OBJECTIVE (LO)<br><br>The learner will: | | PERFORMANCE CRITERIA<br><br>The learner can: | Evidence Type | | | | | Evidence Ref. Page No. | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Replacement of Mass Storage Devices and Random Access Memory** | | replacing old mass storage devices and Random Access Memory (RAM) | | | | | | | | | |
| | 3.2 | Remove mass storage devices from the Case | | | | | | | | | |
| | 3.3 | Replace the integrated drive electronic (IDE) cable | | | | | | | | | |
| | 3.4 | Install Internal Storage Device (HDD/SSD) | | | | | | | | | |
| | 3.5 | Replace the integrated drive electronic (IDE) cable | | | | | | | | | |
| | 3.6 | Install Internal Storage Device (HDD/SSD) | | | | | | | | | |

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| **Learners Signature:** | **Date:** |
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| **IQA Signature (if sampled)** | **Date:** |
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**NATIONAL SKILLS QUALIFICATION**

**LEVEL 2:** *COMPUTER HARDWARE REPAIRS AND MAINTENANCE*

**Unit 5: Faults Trace, Measurement, and troubleshooting in Computers**

**Unit Reference Number: ICT/CMR/005/L2**
**NSQ Level: 2**
**Credit Value: 4**
**Guided Learning Hours (GLH): 40**

**Unit Purpose:** *This unit is designed to provide learners with the knowledge and skills to effectively use the measuring instruments for troubleshooting faulty computers.*

## Unit Assessment Requirements / Evidence Requirements:

Assessment must be done in a real workplace where learning and human development take place.

***Assessment methods include:***

- **Direct Observation (DO):** watching the learner perform tasks.
- **Question and Answer (QA):** asking questions to check understanding.
- **Witness Testimony (WT):** Statements from supervisors or trainers.
- **Assignments (ASS):** Written or practical tasks.

*Assessment methods may vary depending on the trade area.*

**Unit 005:** Faults Trace, Measurement, and troubleshooting in Computers

| **LEARNING OBJECTIVE (LO)**<br><br>**The learner will:** | | **PERFORMANCE CRITERIA**<br><br>**The learner can:** | **Evidence Type** | | | | | **Evidence Ref. Page No.** | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **LO 1: Demonstrate knowledge of Measuring Instruments in Computer Hardware Maintenance and Repairs** | 1.1 | Explain the following terms:<br>i. Voltage;<br>ii. Current;<br>iii. Resistance;<br>iv. Capacitance;<br>v. Inductance;<br>vi. Resistors;<br>vii. Capacitors;<br>viii. Diodes;<br>ix. Transistors;<br>x. Integrated Circuits (ICs) | | | | | | | | | |
| | 1.2 | Describe the measuring instruments meant for computer hardware maintenance and repairs, such as:<br>i. Analog Multimeters;<br>ii. Digital Multimeters;<br>iii. Logic probe Testers;<br>iv. IC Testers;<br>v. Oscilloscopes | | | | | | | | | |
| | 1.3 | Apply the measuring instruments listed in 1.2 above to trace faults | | | | | | | | | |
| **LO 2: Apply Basic Troubleshooting Techniques** | 2.1 | Measure the Alternating Current (AC), Direct Current (DC), and Power units of computer hardware | | | | | | | | | |
| | 2.2 | Test the functionality of all internal and external components and cables in computers | | | | | | | | | |
| | 2.3 | Identify Basic Error messages and their Meanings | | | | | | | | | |
| | 2.4 | Identify Faulty Computer sounds and their Meanings | | | | | | | | | |
| | 2.5 | Search the World Wide Web for a problem<br>Solving Tips and Tutorials | | | | | | | | | |
| **LO 3: Perform Testing on Measuring Instruments In Computer Hardware Maintenance and Repairs** | 3.1 | Perform Continuity Tests on Fuses and Cables | | | | | | | | | |
| | 3.2 | Measure Voltage across the 20-pin ATX Power Connector, 4-pin internal drive, and Power Connector | | | | | | | | | |
| | 3.3 | Follow the Procedures for Testing Components and Modules as specified in the Installation Manuals | | | | | | | | | |

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| **Learners Signature:** | **Date:** |
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| **EQA Signature (if sampled)** | **Date:** |

**NATIONAL SKILLS QUALIFICATION**

**LEVEL 2:** *COMPUTER HARDWARE REPAIRS AND MAINTENANCE*

**Unit 6: GENERAL MAINTENANCE AND REPAIRS OF FAULTY COMPUTERS**

**Unit Reference Number: ICT/CMR/006/L2**
**NSQ Level: 2**
**Credit Value: 4**
**Guided Learning Hours (GLH): 40**

**Unit Purpose:** *This unit is designed to provide learners with the knowledge and skills to apply diagnostic techniques to replace or repair faulty computers and components, resulting in a high degree of customers' satisfaction.*

## Unit Assessment Requirements / Evidence Requirements:

Assessment must be done in a real workplace where learning and human development take place.

***Assessment methods include:***

- **Direct Observation (DO):** watching the learner perform tasks.
- **Question and Answer (QA):** asking questions to check understanding.
- **Witness Testimony (WT):** Statements from supervisors or trainers.
- **Assignments (ASS):** Written or practical tasks.

*Assessment methods may vary depending on the trade area.*

**Unit 006:** GENERAL MAINTENANCE AND REPAIRS OF FAULTY COMPUTERS

| **LEARNING OBJECTIVE (LO)**<br><br>**The learner will:** | | **PERFORMANCE CRITERIA**<br><br>**The learner can:** | **Evidence Type** | | | | | **Evidence Reference Page No.** | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **LO 1:**<br>**Trace Faults During Computer Hardware Maintenance and Repairs** | 1.1 | Perform the Basic Troubleshooting Procedures | | | | | | | | | |
| | 1.2 | Use Measuring Instruments to Trace Faults | | | | | | | | | |
| | 1.3 | Locate Faulty Components by Visual Inspection, Open, or Short Circuit Test | | | | | | | | | |
| | 1.4 | Use Multimeters to check the Current flow and Voltage on the Motherboard | | | | | | | | | |
| | 1.5 | Replace Module or Components with other Spares to eliminate Faults | | | | | | | | | |
| **LO 2:**<br>**Clean Computer Systems During Hardware Maintenance and Repairs** | 2.1 | Identify the following methods involved in cleaning computers:<br>i. Blowing;<br>ii. Dusting/Brushing;<br>iii. Applying solutions | | | | | | | | | |
| | 2.2 | Disassemble the Computer Systems for Cleaning or washing | | | | | | | | | |
| | 2.3 | Identify the Basic Tools Required for System Cleaning:<br>i. Non-lint Cloth;<br>ii. Rubbing/Isopropyl alcohol;<br>iii. Portable Vacuum;<br>iv. Foam/Cotton swabs | | | | | | | | | |
| | 2.4 | Use Isopropyl Alcohol and Brushes to wash Motherboards | | | | | | | | | |
| | 2.5 | Heat the Motherboard with the workplace stations after washing | | | | | | | | | |
| | 2.6 | Use an air blower to remove Dust and Dirt<br>inside the computers | | | | | | | | | |
| **LO 3:**<br>**Know how to Unplug and Plug Computer Components During Troubleshooting** | 3.1 | Apply “halt on” setting in the CMOS setup Utility | | | | | | | | | |
| | 3.2 | Perform plugging and unplugging of the following internal components for error detection and correction:<br>i. L2 cache;<br>ii. Video card;<br>iii. RAM;<br>iv. SSD;<br>v. Hard disk drive (HDD) power | | | | | | | | | |
| | 3.3 | Carry out a “power-on-self” (POST)” check to locate common faults in Computers | | | | | | | | | |

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| **Learners Signature:** | **Date:** |
| **Assessors Signature:** | **Date:** |
| **IQA Signature (if sampled)** | **Date:** |
| **EQA Signature (if sampled)** | **Date:** |

**NATIONAL SKILLS QUALIFICATION**

**LEVEL 2:** *COMPUTER HARDWARE REPAIRS & MAINTENANCE*

**Unit 7: MANAGEMENT OF COMPUTER HARDWARE MAINTENANCE AND REPAIRS**

**Unit Reference Number: ICT/CMR/007/L2**
**NSQ Level: 2**
**Credit Value: 4**
**Guided Learning Hours (GLH): 40**

**Unit Purpose:** *This unit is designed to provide learners with knowledge and skills for applying diagnostic techniques to replace or repair faulty computers and components resulting to high degree of customers' satisfaction.*

## Unit Assessment Requirements / Evidence Requirements:

Assessment must be done in a real workplace where learning and human development take place.

***Assessment methods include:***

- **Direct Observation (DO):** watching the learner perform tasks.
- **Question and Answer (QA):** asking questions to check understanding.
- **Witness Testimony (WT):** Statements from supervisors or trainers.
- **Assignments (ASS):** Written or practical tasks.

*Assessment methods may vary depending on the trade area.*

**Unit 007:** MANAGEMENT OF COMPUTER HARDWARE MAINTENANCE AND REPAIRS

| **LEARNING OBJECTIVE (LO)**<br><br>**The learner will:** | | **PERFORMANCE CRITERIA**<br><br>**The learner can:** | **Evidence Type** | | | | | **Evidence Reference Page No.** | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **LO 1: Understand the Procedure to Set up a Computer Hardware Maintenance and Repairs Workshop** | 1.1 | Describe the appropriate equipment and facilities for setting up computer hardware maintenance and repairs Workshop | | | | | | | | | |
| | 1.2 | Identify appropriate locations for the Workshop | | | | | | | | | |
| | 1.3 | Describe the appropriate size and layout for the Workshop | | | | | | | | | |
| | 1.4 | Maintain Clean, Safe and Secure Workplace Environment | | | | | | | | | |
| **LO 2: Apply Managerial and Customer Service Principles to Computer Hardware Maintenance and Repair Workshop** | 2.1 | Describe how to Attend to customers with Faulty Computers | | | | | | | | | |
| | 2.2 | Explain the normal documentation the process when Collecting and Returning Computers to Customers | | | | | | | | | |
| | 2.3 | Demonstrate Good Communication and Interpersonal Skills to Achieve Customer Satisfaction | | | | | | | | | |
| | 2.4 | Keep Good Records of Incomes, Expenses, Assets, and Liabilities of the Workshop | | | | | | | | | |
| | 2.5 | Estimate the Cost of Repairs of Faulty Computers | | | | | | | | | |
| **LO 3: Raise Funds or Capital for Computer Hardware Maintenance and Repairs Workshop** | 3.1 | Propose a Start-up Capital required for computer hardware maintenance and Repairs Workshop | | | | | | | | | |
| | 3.2 | Identify various Sources of Capital to set up the Workshop | | | | | | | | | |
| | 3.3 | Explain the Returns on Investment (RoI) for the Workshop | | | | | | | | | |
| | 3.4 | Maintain good stock Control and Inventory of Spare Parts and Modules | | | | | | | | | |

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| **Learners Signature:** | **Date:** |
| **Assessors Signature:** | **Date:** |
| **IQA Signature (if sampled)** | **Date:** |
| **EQA Signature (if sampled)** | **Date:** |

**NATIONAL SKILLS QUALIFICATION**

**LEVEL 2:** *COMPUTER HARDWARE REPAIRS & MAINTENANCE*

**UNIT 8: FUNDAMENTALS OF BASIC ELECTRONICS TO COMPUTER HARDWARE MAINTENANCE AND REPAIRS**

**Unit Reference Number: ICT/CMR/008/L2**
**NSQ Level: 2**
**Credit Value: 3**
**Guided Learning Hours (GLH): 30**

**Unit Purpose:** *This unit is designed to provide learners with the knowledge and skills of the Functions and Applications of Basic Electronics to Computer systems*

## Unit Assessment Requirements / Evidence Requirements:

Assessment must be done in a real workplace where learning and human development take place.

***Assessment methods include:***

- **Direct Observation (DO):** watching the learner perform tasks.
- **Question and Answer (QA):** asking questions to check understanding.
- **Witness Testimony (WT):** Statements from supervisors or trainers.
- **Assignments (ASS):** Written or practical tasks.

*Assessment methods may vary depending on the trade area.*

## UNIT 008: FUNDAMENTALS OF BASIC ELECTRONICS TO COMPUTER HARDWARE MAINTENANCE AND REPAIRS

| LEARNING OBJECTIVE (LO)<br><br>The learner will: | | PERFORMANCE CRITERIA<br><br>The learner can: | Evidence Type | | | | | Evidence Ref. Page No. | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **LO 1: Understand the Applications of Resistors in Computers and Electronic Circuits** | 1.1 | Explain the Color Codes of Small Resistors | | | | | | | | | |
| | 1.2 | Identify the resistance of Resistors using color codes:<br>Four-band system;<br>Five-band system | | | | | | | | | |
| | 1.3 | Connect resistors in:<br>Parallel;<br>Series | | | | | | | | | |
| | 1.4 | Draw Resistors in Serial and Parallel Configurations | | | | | | | | | |
| | 1.5 | Use an Ohmmeter to determine the total<br>Resistance of Resistor Configurations | | | | | | | | | |
| | 1.6 | Compare the Ohmmeter Readings with the<br>Calculated Values | | | | | | | | | |
| **LO 2: Apply Capacitors in Computers and Electronic Circuits** | 2.1 | Explain the meaning of a Capacitor | | | | | | | | | |
| | 2.2 | Discuss the Applications of different types of Capacitors in Computers and other Electronics | | | | | | | | | |
| | 2.3 | Draw the Symbols of Capacitors | | | | | | | | | |
| | 2.4 | Define the Capacitance of a Capacitor and<br>It's SI Unit | | | | | | | | | |
| | 2.5 | Connect capacitors in:<br>i. Series;<br>ii. Parallel | | | | | | | | | |
| | 2.6 | Draw Capacitors in Serial and Parallel Configurations | | | | | | | | | |
| | 2.7 | Use multimeter to measure the current and the voltage across the capacitor configurations | | | | | | | | | |
| **LO 3: Understand the Operational Principles and Purpose of Inductors in Computers and Electronic Circuits** | 3.1 | Describe an inductor and how it works | | | | | | | | | |
| | 3.2 | Define the inductance of an inductor and It's SI Unit | | | | | | | | | |
| | 3.3 | Discuss the applications of inductors in computers and other electronics | | | | | | | | | |
| | 3.4 | Connect inductors in:<br>i. Series;<br>ii. Parallel | | | | | | | | | |
| | 3.5 | Draw inductors in serial and parallel configurations | | | | | | | | | |
| | 3.6 | Use Multimeter to measure the Current And Voltage across the Inductor | | | | | | | | | |

| LEARNING OBJECTIVE (LO)<br><br>The learner will: | | PERFORMANCE CRITERIA<br><br>The learner can: | Evidence Type | | | | | Evidence Ref. Page No. | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | configurations | | | | | | | | | |
| **LO 4: Understand the Concept and Applications of Filters in Computers and Electronic Circuits** | 4.1 | Explain the meaning of a Filter and its Application in Computers | | | | | | | | | |
| | 4.2 | Use a simple RC circuit to explain how low-pass Pass Filter work | | | | | | | | | |
| | 4.3 | Draw a simple RC Circuit to illustrate how high-pass Pass Filter work | | | | | | | | | |
| | 4.4 | Draw a Band Pass Filter Circuit and show how it works | | | | | | | | | |
| | 4.5 | Discuss the Band Stop Filter Circuit and its Applications | | | | | | | | | |
| | 4.6 | Use resistors and capacitors to construct the following filters:<br>i. Low Pass;<br>ii. High Pass;<br>iii. Band Pass;<br>iv. Band Stop | | | | | | | | | |
| **LO 5: Understand the Concept and Applications of Semiconductors in Computers and Electronic Circuits** | 5.1 | Discuss Semiconductor materials and Effect of Doping on these materials | | | | | | | | | |
| | 5.2 | Explain PN Junction Diode and its Composition | | | | | | | | | |
| | 5.3 | State the difference between forward biased and reverse biased diodes | | | | | | | | | |
| | 5.4 | Apply Diode in:<br>i. Half Wave Rectification;<br>ii. Full Wave Rectification;<br>Bride Rectification | | | | | | | | | |
| | 5.5 | Identify the uses of Zenger Diode | | | | | | | | | |
| **LO 6: Identify the Uses of Bipolar Junction Transistors and Field Effect Transistors in Computers** | 6.1 | Use Simple diagrams to explain the Physical Configuration and Types of Bipolar Junction Transistors | | | | | | | | | |
| | 6.2 | State the basic functions of transistors, namely:<br>i. Switching.<br>Amplification | | | | | | | | | |
| | 6.3 | Test the functionality of Transistors | | | | | | | | | |
| | 6.4 | State the applications of the following in computers:<br>i. Junction field effect transistors (JFET);<br>ii. Metal Oxide Semiconductor Field<br>Effect Transistors (MOSFET) | | | | | | | | | |
| **LO 7: Understand the types and Applications of Optoelectronics** | 7.1 | Discuss Optoelectronics and its two main categories:<br>i. Light Emitting;<br>ii. Light Detecting | | | | | | | | | |
| | 7.2 | Identify the following Light Emitting | | | | | | | | | |

| LEARNING OBJECTIVE (LO)<br><br>The learner will: | | PERFORMANCE CRITERIA<br><br>The learner can: | Evidence Type | | | | | Evidence Ref. Page No. | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Diodes and their uses:<br>i. Visible-Light LED;<br>ii. Blinking.<br>iii. Tricolor.<br>iv. 7-Segment LED Display | | | | | | | | | |
| | 7.3 | Identify the following Light Detecting Devices and their Applications:<br>i. Photoresistors.<br>ii. Photodiode.<br>iii. Solar cell;<br>iv. Phototransistor | | | | | | | | | |
| **LO 8: Identify Types and uses of Integrated Circuits (ICs) in Computers** | 8.1 | Identify Integrated Circuits in the Circuit Boards or Motherboards | | | | | | | | | |
| | 8.2 | State the Advantages and Disadvantages of Integrated Circuits | | | | | | | | | |
| | 8.3 | Identify the Basic Types of IC Packages in Computers:<br>i. TO-5 Package;<br>ii. Flat Package;<br>iii. Dual In line (DIL) | | | | | | | | | |
| | 8.4 | Draw the IC Symbols | | | | | | | | | |
| | 8.5 | State the Uses of the following ICs:<br>i. Voltage Regulator.<br>ii. 555 Timer.<br>iii. Operational Amplifiers | | | | | | | | | |
| | 8.6 | Construct simple electronic circuits or projects using common electronic components and ICs | | | | | | | | | |

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| **Learners Signature:** | **Date:** |
| **Assessors Signature:** | **Date:** |
| **IQA Signature (if sampled)** | **Date:** |
| **EQA Signature (if sampled)** | **Date:** |

**NATIONAL SKILLS QUALIFICATION**

**LEVEL 2:** *COMPUTER HARDWARE REPAIRS & MAINTENANCE*

**Unit 9: FUNDAMENTAL PRINCIPLES OF USING PRINTERS, PHOTOCOPY MACHINES AND SCANNERS**

**Unit Reference Number: ICT/CMR/009/L2**
**NSQ Level: 2**
**Credit Value: 3**
**Guided Learning Hours (GLH): 30**

**Unit Purpose:** *This unit is designed to equip learners with the knowledge and skills to operate and maintain printing, scanning, and photocopying technologies in a workplace environment.*

## Unit Assessment Requirements / Evidence Requirements:

Assessment must be done in a real workplace where learning and human development take place.

***Assessment methods include:***

- **Direct Observation (DO):** watching the learner perform tasks.
- **Question and Answer (QA):** asking questions to check understanding.
- **Witness Testimony (WT):** Statements from supervisors or trainers.
- **Assignments (ASS):** Written or practical tasks.

*Assessment methods may vary depending on the trade area.*

**Unit 009:** FUNDAMENTAL PRINCIPLES OF USING PRINTERS, PHOTOCOPIERS, AND MACHINES AND SCANNERS

| **LEARNING OBJECTIVE (LO)**<br><br>**The learner will:** | | **PERFORMANCE CRITERIA**<br><br>**The learner can:** | **Evidence Type** | | | | | **Evidence Reference Page No.** | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **LO 1: Understand the Basic Operation and Maintenance of Printers** | 1.1 | Explain various types of printers with their examples each:<br>Impact;<br>Non-impact | | | | | | | | | |
| | 1.2 | Identify printer components and consumables | | | | | | | | | |
| | 1.3 | Describe the control panel functions of a<br>Printer | | | | | | | | | |
| | 1.4 | Identify the following printer interfaces with computers:<br>● Parallel port<br>● USB port<br>● Serial port<br>● Wireless (Bluetooth, Wi-Fi, Infrared);<br>● Small Computer System Interface<br>● (SCSI) | | | | | | | | | |
| | 1.5 | Perform Installation and Configuration of Printers | | | | | | | | | |
| | 1.6 | Perform the following operations:<br>Print documents.<br>Cancel print documents | | | | | | | | | |
| | 1.7 | Change Printer Settings to Optimize Performance | | | | | | | | | |
| | 1.8 | Perform Replacement and Refilling of Printer Cartridge/Ink Toner | | | | | | | | | |
| | 1.9 | Connect Printers to a Wired or Wireless Network | | | | | | | | | |
| **LO 2: Apply Basic Maintenance Procedures to Local or Network Printers** | 2.1 | Explain Error Codes and messages of Printers | | | | | | | | | |
| | 2.2 | Use relevant Diagnostic Tools to Eliminate<br>Faults | | | | | | | | | |
| | 2.3 | Review Service and Installation Manuals | | | | | | | | | |
| | 2.4 | Isolate the Problems of the Printers | | | | | | | | | |
| | 2.5 | Replace Parts and Consumables as needed | | | | | | | | | |
| | 2.6 | Test run the Repaired Printer to | | | | | | | | | |

| LEARNING OBJECTIVE (LO)<br><br>The learner will: | | PERFORMANCE CRITERIA<br><br>The learner can: | Evidence Type | | | | | Evidence Reference Page No. | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Ascertain its Functionality | | | | | | | | | |
| | 2.7 | Install missing Printer Drivers | | | | | | | | | |
| | 2.8 | Fix Printer IP-Address problem (for Printers connected on a network) | | | | | | | | | |
| **LO 3: Understand the Basic Operation and Maintenance of Photocopy Machines** | 3.1 | Identify parts of a Photocopy Machine | | | | | | | | | |
| | 3.2 | Operate Photocopy Machine | | | | | | | | | |
| | 3.3 | Replace Toner and Other Consumables | | | | | | | | | |
| | 3.4 | Clear Paper Jam and Other Error Messages | | | | | | | | | |
| **LO 4: Understand the Basic Operation and Maintenance of Scanners** | 4.1 | Identify parts of a Scanner | | | | | | | | | |
| | 4.2 | Outline the operation of a Scanner | | | | | | | | | |
| | 4.3 | Explain the Types of Scanners and their advantages:<br>i. Handheld<br>ii. Flatbed<br>iii. Specialized | | | | | | | | | |
| | 4.4 | Connect a Scanner to a Computer | | | | | | | | | |
| | 4.5 | Perform Installation of Scanner and un-install it | | | | | | | | | |
| | 4.6 | Use Scanner correctly | | | | | | | | | |

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| **Learners Signature:** | **Date:** |
| **Assessors Signature:** | **Date:** |
| **IQA Signature (if sampled)** | **Date:** |
| **EQA Signature (if sampled)** | **Date:** |

| Level | Resources |
|---|---|
| **Two** | **1. All Resources in NVQ Level One**<br>**2. Computer Systems (faulty or working)**<br>**3. Video Clips**<br>**4. Logic Probe Testers**<br>**5. IC testers**<br>**6. Oscilloscopes**<br>**7. Cleaning Fluid or Mentholated Spirit**<br>**8. Brushes**<br>**9. Electronic Components, ICs**<br>**10. Printers**<br>**11. Scanners**<br>**12. Photocopying Machines**<br>**13. Operational and Installation manuals**<br>**14. Formatting discs (Windows 8/10 and any current versions)** |

NATIONAL SKILLS QUALIFICATION

# COMPUTER HARDWARE REPAIRS & MAINTENANCE

# LEVEL 3

FEBRUARY, 2025

**NATIONAL SKILLS QUALIFICATION**

**NSQ LEVEL 3 - COMPUTER HARDWARE MAINTENANCE**

# GENERAL INFORMATION

**QUALIFICATION PURPOSE**

*This qualification is designed to equip learners with the technical skills and knowledge to independently perform the installation, troubleshooting, repair, and maintenance of computer hardware, ensuring optimal performance and adherence to safety standards in a professional setting.*

**QUALIFICATION OBJECTIVES**

Upon completing this qualification, learners should be able to:

- Apply advanced Occupational Health and Safety procedures when handling sensitive hardware.
- Demonstrate leadership and problem-solving skills in a professional IT environment.
- install, configure, and upgrade computer hardware systems.
- Diagnose and troubleshoot hardware malfunctions using specialized tools and techniques.
- Optimize system performance through preventive maintenance and advanced tuning.
- Integrate and secure computer hardware in enterprise environments.
- Analyze and implement emerging technologies such as cloud-based hardware diagnostics and AI-driven predictive maintenance.

**Mandatory Units**

| Unit No | Reference Number | NOS Title | Credit Value | Guided Learning Hours | Remark |
|---|---|---|---|---|---|
| Unit 001 | ICT/CMR/001/L3 | Health and Safety in Hardware Maintenance | 1 | 10 | |
| Unit 002 | ICT/GSS/002/L3 | Teamwork | 1 | 10 | |
| Unit 003 | ICT/GSS/003/L3 | Communication | 1 | 10 | |
| Unit 004 | ICT/CMR/004/L3 | Computer Hardware | 2 | 20 | |
| Unit 005 | ICT/CMR/005/L3 | Installation of Computer Hardware Components | 3 | 30 | |
| Unit 006 | ICT/CMR/006/L3 | Troubleshooting Computer Hardware and Related Issues | 3 | 30 | |
| Unit 007 | ICT/CMR/007/L3 | Repair and Maintenance of Computer Systems | 3 | 30 | |
| Unit 008 | ICT/CMR/008/L3 | Power Supply and Cooling Systems | 2 | 20 | |
| Unit 009 | ICT/CMR/009/L3 | Data Storage Devices and Backup Solutions | 3 | 30 | |
| Unit 010 | ICT/CMR/010/L3 | Introduction to Software Interaction with Hardware | 3 | 30 | |
| Unit 011 | ICT/CMR/011/L3 | Computer Networking Basics | 3 | 30 | |
| | | TOTAL | 25 | 250 | |

**NOTE:**

**Mandatory Units**

*Learners must complete all mandatory units to gain a solid foundation in computer hardware installation and maintenance. These units are designed to provide essential knowledge and practical skills critical for performing independent work in this field. The credit hours for mandatory units are non-negotiable and must be fully completed to obtain the qualification.*

*Total Credit Hours from Mandatory Units:* ***250***

**NATIONAL SKILLS QUALIFICATION**

**LEVEL 3:** *COMPUTER HARDWARE REPAIRS AND MAINTENANCE*

**Unit 1: HEALTH AND SAFETY IN HARDWARE MAINTENANCE**

**Unit Reference Number: ICT/CMR/001/L3**
**NSQ Level: 3**
**Credit Value: 1**
**Guided Learning Hours (GLH): 10**

**Unit Purpose:**
*The purpose of this unit is to equip learners with the knowledge and skills required to safely handle and maintain computer hardware, ensuring compliance with industry safety standards and minimizing risks of injury or damage during maintenance tasks.*

## Unit Assessment Requirements / Evidence Requirements:

Assessment must be done in a real workplace where learning and human development take place.

***Assessment methods include:***

- **Direct Observation (DO):** watching the learner perform tasks.
- **Question and Answer (QA):** asking questions to check understanding.
- **Witness Testimony (WT):** Statements from supervisors or trainers.
- **Assignments (ASS):** Written or practical tasks.

*Assessment methods may vary depending on the trade area.*

**UNIT 001:** HEALTH AND SAFETY IN HARDWARE MAINTENANCE

| **LEARNING OBJECTIVE (LO)**<br><br>**The learner will:** | | **PERFORMANCE CRITERIA**<br><br>**The learner can:** | **Evidence Type** | | | | | **Evidence Ref. Page No.** | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **LO 1:**<br>**Apply health and safety regulations in hardware maintenance.** | 1.1 | Explain the key health and safety regulations relevant to hardware maintenance. | | | | | | | | | |
| | 1.2 | Demonstrate the use of personal protective equipment (PPE) during hardware installation and repair activities. | | | | | | | | | |
| | 1.3 | Demonstrate safe handling and discharge of static electricity to prevent equipment damage and injury. | | | | | | | | | |
| | 1.4 | Ensure proper grounding techniques are applied when working with electronic components. | | | | | | | | | |
| **LO 2:**<br>**Mitigate risks associated with electrostatic discharge (ESD) and electrical hazards.** | 2.1 | Identify hazardous materials in electronic components that require special disposal methods. | | | | | | | | | |
| | 2.2 | Follow local regulations and guidelines for the disposal of electronic waste and recycling. | | | | | | | | | |
| | 2.3 | Demonstrate the proper procedure for safely dismantling and segregating electronic parts for disposal. | | | | | | | | | |
| | 2.4 | Maintain accurate documentation of waste disposal processes for compliance purposes. | | | | | | | | | |
| **LO 3:**<br>**Follow safe procedures for the disposal of electronic waste (e-waste).** | 3.1 | Identify types of e-waste generated from hardware maintenance activities and explain their environmental impact. | | | | | | | | | |
| | 3.2 | Demonstrate proper procedures for the segregation, recycling, and disposal of e-waste following local and international regulations. | | | | | | | | | |
| | 3.3 | Ensure compliance with hazardous material handling guidelines, such as those for batteries, circuit boards, and other toxic components. | | | | | | | | | |

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| Learner's Signature | Date: |
| Assessor's Signature | Date: |
| IQA's Signature | Date: |
| EQA's Signature | Date: |

**NATIONAL SKILLS QUALIFICATION**

**LEVEL 3:** *COMPUTER HARDWARE REPAIRS AND MAINTENANCE*

**Unit 2: TEAMWORK**

**Unit Reference Number: ICT/GSS/002/L3**
**NSQ Level: 3**
**Credit Value: 1**
**Guided Learning Hours (GLH): 10**

**Unit Purpose:**
*This unit is designed to provide learners with the knowledge and skills to effectively collaborate with others in an IT work environment, ensuring the successful completion of tasks through clear communication, mutual support, and coordinated efforts.*

## Unit Assessment Requirements / Evidence Requirements:

Assessment must be done in a real workplace where learning and human development take place.

***Assessment methods include:***

- **Direct Observation (DO):** watching the learner perform tasks.
- **Question and Answer (QA):** asking questions to check understanding.
- **Witness Testimony (WT):** Statements from supervisors or trainers.
- **Assignments (ASS):** Written or practical tasks.

*Assessment methods may vary depending on the trade area.*

**UNIT 002:** TEAMWORK

| **LEARNING OBJECTIVE (LO)**<br><br>**The learner will:** | | **PERFORMANCE CRITERIA**<br><br>**The learner can:** | **Evidence Type** | | | | | **Evidence Ref. Page No.** | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **LO 1: Understand the Importance of Teamwork in the Workplace** | 1.1 | Explain the role of teamwork in achieving organizational goals and improving workplace productivity. | | | | | | | | | |
| | 1.2 | Describe the characteristics of effective teams and their contribution to a positive work environment. | | | | | | | | | |
| | 1.3 | Identify the benefits of collaboration and mutual support in problem-solving and project execution. | | | | | | | | | |
| **LO 2: Contribute to Team Goals and Objectives** | 2.1 | Identify team goals and individual responsibilities to ensure alignment with overall objectives. | | | | | | | | | |
| | 2.2 | Demonstrate a willingness to take on tasks and share knowledge to help the team achieve its targets. | | | | | | | | | |
| | 2.3 | Prioritize team success over individual achievement, fostering a cooperative working environment. | | | | | | | | | |
| **L O 3: Collaborate in Problem-Solving and Decision-Making** | 3.1 | Participate in brainstorming sessions, offering solutions and ideas to address team challenges. | | | | | | | | | |
| | 3.2 | Engage in group decision-making processes, contributing insights and supporting outcomes. | | | | | | | | | |
| | 3.3 | Respect and value the diverse perspectives and expertise of team members in finding solutions. | | | | | | | | | |

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| Learner's Signature | Date: |
| Assessor's Signature | Date: |
| IQA's Signature | Date: |
| EQA's Signature | Date: |

**NATIONAL SKILLS QUALIFICATION**

**LEVEL 3:** *COMPUTER HARDWARE REPAIRS AND MAINTENANCE*

**Unit 3: COMMUNICATION**

**Unit Reference Number: ICT/GSS/003/L3**
**NSQ Level: 3**
**Credit Value: 1**
**Guided Learning Hours (GLH): 10**

**Unit Purpose:**
*This unit is designed to provide learners with the knowledge and skills to communicate effectively in an IT work environment, ensuring clarity, professionalism, and efficiency in both verbal and written communication across various platforms.*

## Unit Assessment Requirements / Evidence Requirements:

Assessment must be done in a real workplace where learning and human development take place.

***Assessment methods include:***

- **Direct Observation (DO):** watching the learner perform tasks.
- **Question and Answer (QA):** asking questions to check understanding.
- **Witness Testimony (WT):** Statements from supervisors or trainers.
- **Assignments (ASS):** Written or practical tasks.

*Assessment methods may vary depending on the trade area.*

**UNIT 003:** COMMUNICATION

| LEARNING OBJECTIVE (LO)<br><br>The learner will: | | PERFORMANCE CRITERIA<br><br>The learner can: | Evidence Type | | | | | Evidence Ref. Page No. | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **LO 1: Communicate Clearly and Professionally in the Workplace** | 1.1 | Use clear and concise language in verbal and written communication, ensuring messages are understood by the intended audience. | | | | | | | | | |
| | 1.2 | Apply professional tone and etiquette in emails, reports, and meetings. | | | | | | | | | |
| | 1.3 | Adjust communication style based on the audience, whether colleagues, clients, or stakeholders. | | | | | | | | | |
| **LO 2: Use Technology to Facilitate Effective Communication** | 2.1 | Demonstrate proficiency in using digital communication tools such as emails, messaging apps, and project management platforms. | | | | | | | | | |
| | 2.2 | Participate in virtual meetings, using videoconferencing software and adhering to proper online meeting etiquette. | | | | | | | | | |
| | 2.3 | Utilize collaborative tools to share information and updates efficiently. | | | | | | | | | |
| **LO 3: Resolve Communication Barriers and Foster Open Dialogue** | 3.1 | Identify and address potential communication barriers, such as language differences, cultural misunderstandings, or unclear instructions. | | | | | | | | | |
| | 3.2 | Encourage open dialogue by actively listening to feedback, asking clarifying questions, and inviting input from all parties. | | | | | | | | | |
| | 3.3 | Apply conflict resolution strategies to address miscommunication. | | | | | | | | | |

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| Learner's Signature | Date: |
| Assessor's Signature | Date: |
| IQA's Signature | Date: |
| EQA's Signature | Date: |

**NATIONAL SKILLS QUALIFICATION**

**LEVEL 3:** *COMPUTER HARDWARE REPAIRS & MAINTENANCE*

**Unit 4: COMPUTER HARDWARE**

**Unit Reference Number: ICT/CMR/004/L3**
**NSQ Level: 3**
**Credit Value: 1**
**Guided Learning Hours (GLH): 30**

**Unit Purpose:**
*This unit is to provide learners with knowledge of the components, functions, and basic operations of computer hardware, enabling them to understand system architecture and prepare for more advanced installation and maintenance tasks.*

## Unit Assessment Requirements / Evidence Requirements:

Assessment must be done in a real workplace where learning and human development take place.

***Assessment methods include:***

- **Direct Observation (DO):** watching the learner perform tasks.
- **Question and Answer (QA):** asking questions to check understanding.
- **Witness Testimony (WT):** Statements from supervisors or trainers.
- **Assignments (ASS):** Written or practical tasks.

*Assessment methods may vary depending on the trade area.*

**UNIT 004: Computer Hardware**

| LEARNING OBJECTIVE (LO)<br><br>The learner will: | | PERFORMANCE CRITERIA<br><br>The learner can: | Evidence Type | | | | | Evidence Ref. Page No. | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **LO 1: Review of Computer Hardware Components** | 1.1 | Enumerate the primary internal components of a computer system, including the CPU, RAM, motherboard, power supply, and storage devices. | | | | | | | | | |
| | 1.2 | Describe the functional roles of each component within the system architecture, emphasizing data processing, storage, and power distribution. | | | | | | | | | |
| | 1.3 | Differentiate between types and purposes of peripheral devices, such as input/output devices, external storage, and specialized hardware. | | | | | | | | | |
| | 1.4 | Describe the physical attributes and configurations of key hardware components. | | | | | | | | | |
| **LO 2: Understand System Architecture and Data Flow** | 2.1 | Explain the basic architecture of a computer system, detailing subsystems and interconnections. | | | | | | | | | |
| | 2.2 | Describe the data flow between internal and external components. | | | | | | | | | |
| | 2.3 | Describe the pathways and processes involved in data flow in hardware and software in a computer system. | | | | | | | | | |
| | 2.4 | Interpret diagrams representing system architecture and data flow. | | | | | | | | | |
| **LO 3: Understand Hardware Compatibility and Specifications** | 3.1 | Discuss key specifications of hardware components, such as clock speed, memory capacity, and connectivity standards. | | | | | | | | | |
| | 3.2 | Evaluate hardware compatibility issues related to component selection when assembling or upgrading a computer system. | | | | | | | | | |

| LEARNING OBJECTIVE (LO)<br><br>The learner will: | | PERFORMANCE CRITERIA<br><br>The learner can: | Evidence Type | | | | | Evidence Ref. Page No. | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 3.3 | Compare specifications of different hardware options to determine suitability for specific tasks and optimal solutions for specific operational needs. | | | | | | | | | |
| | 3.4 | Explain the importance of adhering to manufacturer guidelines and specifications during component installation and system upgrades. | | | | | | | | | |
| **LO 4: Develop Assembly and Disassembly Skills** | 4.1 | Demonstrate safe and proper techniques for assembling and disassembling computer hardware. | | | | | | | | | |
| | 4.2 | Identify essential tools and equipment for hardware assembly and maintenance tasks. | | | | | | | | | |
| | 4.3 | Execute step-by-step procedures to assemble a functional computer system from individual components. | | | | | | | | | |
| | 4.4 | Conduct a practical mock assembly or disassembly exercise to reinforce proper skills and ensure understanding of hardware interaction and troubleshooting methods. | | | | | | | | | |

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| Learner's Signature | Date: |
| Assessor's Signature | Date: |
| IQA's Signature | Date: |
| EQA's Signature | Date: |

**NATIONAL SKILLS QUALIFICATION**

**LEVEL 3:** *COMPUTER HARDWARE REPAIRS & MAINTENANCE*

**Unit 5: INSTALLATION OF COMPUTER HARDWARE COMPONENTS.**

**Unit Reference Number: ICT/CMR/005/L3**
**NSQ Level: 3**
**Credit Value: 1**
**Guided Learning Hours (GLH): 30**

**Unit Purpose:**
*This unit is designed to equip learners with the skills and knowledge required to effectively install, configure, and integrate various computer hardware components, ensuring optimal system performance and functionality.*

## Unit Assessment Requirements / Evidence Requirements:

Assessment must be done in a real workplace where learning and human development take place.

***Assessment methods include:***

- **Direct Observation (DO):** watching the learner perform tasks.
- **Question and Answer (QA):** asking questions to check understanding.
- **Witness Testimony (WT):** Statements from supervisors or trainers.
- **Assignments (ASS):** Written or practical tasks.

*Assessment methods may vary depending on the trade area.*

**Unit 005: Installation of Computer Hardware Components.**

| LEARNING OBJECTIVE (LO)<br><br>The learner will: | | PERFORMANCE CRITERIA<br><br>The learner can: | Evidence Type | | | | | Evidence Reference Page No. | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **LO 1: Install Internal Hardware Components** | 1.1 | Identify the required tools and equipment for installing internal components such as the motherboard, CPU, RAM, and storage devices. | | | | | | | | | |
| | 1.2 | Safely remove and replace internal hardware components in a computer system. | | | | | | | | | |
| | 1.3 | Follow manufacturer specifications and best practices during the installation process to ensure proper function. | | | | | | | | | |
| | 1.4 | Carry out a successful installation through system boot-up and BIOS/UEFI checks. | | | | | | | | | |
| **LO 2: Configure Peripheral Devices** | 2.1 | Identify various types of input devices (e.g., keyboards, mice), | | | | | | | | | |
| | 2.2 | Identify various types of output devices (e.g., monitors, printers), and external storage devices. | | | | | | | | | |
| | 2.3 | Demonstrate the physical installation of peripheral devices, ensuring a proper connection to the computer system | | | | | | | | | |
| | 2.4 | Install necessary drivers and software for proper device functionality. | | | | | | | | | |
| | 2.5 | Conduct testing to confirm successful operation of installed peripheral devices. | | | | | | | | | |
| **LO 3: Understand Cable Management Practices** | 3.1 | Identify the different types of cables used in computer hardware installations, including power, data, and peripheral cables. | | | | | | | | | |
| | 3.2 | Demonstrate proper routing and organization of cables to promote airflow and prevent physical damage. | | | | | | | | | |
| | 3.3 | Implement techniques for securing cables within the computer case to enhance safety and aesthetics. | | | | | | | | | |
| | 3.4 | Explain the impact of effective cable management on system performance and maintenance. | | | | | | | | | |
| **LO 4:** | 4.1 | Configure system BIOS/UEFI settings to recognize newly installed components. | | | | | | | | | |

| LEARNING OBJECTIVE (LO)<br><br>The learner will: | | PERFORMANCE CRITERIA<br><br>The learner can: | Evidence Type | | | | | Evidence Reference Page No. | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Conduct System Configuration and Optimization Post-Installation** | 4.2 | Optimize hardware settings for performance, including adjusting boot priorities and enabling/disabling features. | | | | | | | | | |
| | 4.3 | Perform operating system installations | | | | | | | | | |
| | 4.4 | Configure settings in 4.3 to ensure compatibility with installed hardware | | | | | | | | | |
| | 4.5 | Conduct a thorough system check to verify that all components are functioning as intended and meet performance benchmarks. | | | | | | | | | |

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| Learner's Signature | Date: |
| Assessor's Signature | Date: |
| IQA's Signature | Date: |
| EQA's Signature | Date: |

**NATIONAL SKILLS QUALIFICATION**

**LEVEL 3:** *COMPUTER HARDWARE REPAIRS AND MAINTENANCE*

**Unit 6: Troubleshooting Computer Hardware Issues.**

**Unit Reference Number: ICT/CMR/006/L3**
**NSQ Level: 3**
**Credit Value: 1**
**Guided Learning Hours: 30**

**Unit Purpose:**
*This unit is to provide learners with the skills and methodologies needed to systematically diagnose, analyze, and resolve hardware problems, ensuring effective restoration of computer systems to optimal functionality.*

## Unit Assessment Requirements / Evidence Requirements:

Assessment must be done in a real workplace where learning and human development take place.

***Assessment methods include:***

- **Direct Observation (DO):** watching the learner perform tasks.
- **Question and Answer (QA):** asking questions to check understanding.
- **Witness Testimony (WT):** Statements from supervisors or trainers.
- **Assignments (ASS):** Written or practical tasks.

*Assessment methods may vary depending on the trade area.*

**UNIT 006: Troubleshooting Computer Hardware and Related Issues**

| LEARNING OBJECTIVE (LO)<br><br>The learner will: | | PERFORMANCE CRITERIA<br><br>The learner can: | Evidence Type | | | | | Evidence Ref. Page No. | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **LO 1: Identify Common Hardware Problems** | 1.1 | Recognize symptoms of common hardware failures, such as failure to boot, error beep codes, unusual noises, and overheating. | | | | | | | | | |
| | 1.2 | Differentiate between hardware- and software-related issues based on observed symptoms. | | | | | | | | | |
| | 1.3 | Demonstrate and observe symptoms and potential causes for effective communication and analysis. | | | | | | | | | |
| | 1.4 | Utilize checklists to systematically evaluate hardware components for common issues. | | | | | | | | | |
| **LO 2: Apply Diagnostic Tools and Techniques** | 2.1 | Demonstrate the use of diagnostic software and tools to identify hardware issues (e.g., POST codes, hardware diagnostic tools). | | | | | | | | | |
| | 2.2 | Conduct visual inspections of hardware components to detect physical damage or disconnections. | | | | | | | | | |
| | 2.3 | Utilize multimeters and other testing devices to measure electrical quantities such as current, voltage, resistance, and power | | | | | | | | | |
| | 2.4 | Interpret diagnostic results to formulate a troubleshooting strategy. | | | | | | | | | |
| **LO 3: Develop Effective Troubleshooting Methodologies** | 3.1 | Implement a systematic approach to troubleshooting, including problem identification, hypothesis formulation, and testing solutions. | | | | | | | | | |
| | 3.2 | Prioritize troubleshooting steps based on the severity and impact of identified issues. | | | | | | | | | |
| | 3.3 | Demonstrate the troubleshooting process, including steps taken and outcomes observed, for future reference. | | | | | | | | | |
| | 3.4 | Communicate findings and recommended solutions clearly to clients or team members. | | | | | | | | | |
| **LO 4:** | 4.1 | Troubleshoot software-related issues | | | | | | | | | |

| LEARNING OBJECTIVE (LO)<br><br>The learner will: | | PERFORMANCE CRITERIA<br><br>The learner can: | Evidence Type | | | | | Evidence Ref. Page No. | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Troubleshoot Software-Hardware Interaction Issues** | 4.2 | Perform regular software maintenance tasks, including updates, patches, and virus scans, to maintain system security and performance. | | | | | | | | | |
| | 4.3 | Utilize diagnostic tools and techniques to identify and resolve issues related to hardware recognition and software functionality. | | | | | | | | | |
| | 4.4 | Demonstrate troubleshooting steps and solutions for future reference and knowledge sharing. | | | | | | | | | |
| **LO 5: Troubleshoot Basic Networking Issues** | 5.1 | Develop a systematic approach to diagnosing common networking problems, such as connectivity issues and slow performance. | | | | | | | | | |
| | 5.2 | Utilize diagnostic tools and commands (e.g., ipconfig, ping, netstat) to identify and resolve network issues. | | | | | | | | | |
| | 5.3 | Demonstrate troubleshooting steps taken and solutions implemented for reference and future learning. | | | | | | | | | |
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| Learner's Signature | Date: |
| Assessor's Signature | Date: |
| IQA's Signature | Date: |
| EQA's Signature | Date: |

**NATIONAL SKILLS QUALIFICATION**

**LEVEL 3:** *COMPUTER HARDWARE REPAIRS AND MAINTENANCE*

**Unit 7: REPAIR AND MAINTENANCE OF COMPUTER SYSTEMS**

**Unit Reference Number: ICT/CMR/007/L3**
**NSQ Level: 3**
**Credit Value: 1**
**Guided Learning Hours (GLH): 30**

**Unit Purpose:**
*This unit is to equip learners with the knowledge and practical skills necessary to effectively diagnose, repair, and perform routine maintenance on computer systems, ensuring their longevity, reliability, and optimal performance.*

## Unit Assessment Requirements / Evidence Requirements:

Assessment must be done in a real workplace where learning and human development take place.

***Assessment methods include:***

- **Direct Observation (DO):** watching the learner perform tasks.
- **Question and Answer (QA):** asking questions to check understanding.
- **Witness Testimony (WT):** Statements from supervisors or trainers.
- **Assignments (ASS):** Written or practical tasks.

*Assessment methods may vary depending on the trade area.*

**UNIT 007: Repair and Maintenance of Computer Systems**

| LEARNING OBJECTIVE (LO)<br><br>The learner will: | | PERFORMANCE CRITERIA<br><br>The learner can: | Evidence Type | | | | | Evidence Ref. Page No. | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **LO 1: Diagnose Computer System Issues** | 1.1 | Conduct systematic diagnostic techniques to identify hardware and software issues within computer systems. | | | | | | | | | |
| | 1.2 | Interpret error messages and codes to pinpoint specific problems. | | | | | | | | | |
| | 1.3 | Conduct thorough assessments of system performance and functionality. | | | | | | | | | |
| | 1.4 | Document diagnostic findings and proposed solutions for clarity and reference. | | | | | | | | | |
| **LO 2: Perform Hardware Repairs and Replacements** | 2.1 | Safely disassemble computer systems to access and replace faulty components, such as hard drives, power supplies, and cooling systems. | | | | | | | | | |
| | 2.2 | Demonstrate proper techniques for repairing or replacing damaged hardware while adhering to safety protocols. | | | | | | | | | |
| | 2.3 | Demonstrate how to use compatible replacement parts by verifying specifications and following manufacturer guidelines. | | | | | | | | | |
| | 2.4 | Conduct functionality tests on repaired systems to confirm successful resolution of issues. | | | | | | | | | |
| **LO 3:** Conduct Software Maintenance and Updates | 3.1 | Install, configure, and update operating systems and application software as needed. | | | | | | | | | |
| | 3.2 | Perform regular software maintenance tasks, including updates, patches, and virus scans, to maintain system security and performance. | | | | | | | | | |
| | 3.3 | Troubleshoot software-related issues and implement effective solutions. | | | | | | | | | |
| | 3.4 | Document software installations and updates for tracking and future reference. | | | | | | | | | |
| **LO 4:** Implement Preventive | 4.1 | Execute a preventive maintenance plan that includes regular system checks and component cleaning. | | | | | | | | | |
| | | | | | | | | | | | |

| LEARNING OBJECTIVE (LO)<br><br>The learner will: | | PERFORMANCE CRITERIA<br><br>The learner can: | Evidence Type | | | | | Evidence Ref. Page No. | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Maintenance Strategies | 4.2 | Analyze the effectiveness of preventive maintenance actions and make recommendations for improvement. | | | | | | | | | |
| | 4.3 | Maintain accurate records of maintenance activities, repairs, and system performance for continuous monitoring. | | | | | | | | | |
| **LO 5: Know System Security and Data Protection** | 5.1 | Use security measures such as firewalls and antivirus software to protect computer systems from threats. | | | | | | | | | |
| | 5.2 | Conduct regular data backups and develop recovery plans to safeguard critical information. | | | | | | | | | |
| | 5.3 | Explain safe computing practices to minimize the risk of data loss or system compromise. | | | | | | | | | |
| | 5.4 | Update security protocols based on emerging threats and vulnerabilities. | | | | | | | | | |

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| EQA's Signature | Date: |

**NATIONAL SKILLS QUALIFICATION**

**LEVEL 3:** *COMPUTER HARDWARE REPAIRS & MAINTENANCE*

**Unit 8: POWER SUPPLY AND COOLING SYSTEMS**

**Unit Reference Number: ICT/CMR/008/L3**
**NSQ Level: 3**
**Credit Value: 1**
**Guided Learning Hours (GLH): 30**

**Unit Purpose:**
*This unit is to provide learners with knowledge and skills of power supply units and cooling mechanisms, enabling them to install, troubleshoot, and maintain these critical components to ensure the efficient and reliable operation of computer systems.*

## Unit Assessment Requirements / Evidence Requirements:

Assessment must be done in a real workplace where learning and human development take place.

***Assessment methods include:***

- **Direct Observation (DO):** watching the learner perform tasks.
- **Question and Answer (QA):** asking questions to check understanding.
- **Witness Testimony (WT):** Statements from supervisors or trainers.
- **Assignments (ASS):** Written or practical tasks.

*Assessment methods may vary depending on the trade area.*

**UNIT 008: Power Supply and Cooling Systems**

| LEARNING OBJECTIVE (LO)<br><br>The learner will: | | PERFORMANCE CRITERIA<br><br>The learner can: | Evidence Type | | | | | Evidence Ref. Page No. | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **LO 1: Understand Power Supply Unit (PSU) Specifications and Functionality** | 1.1 | Describe the role and importance of the power supply unit in a computer system. | | | | | | | | | |
| | 1.2 | Identify types of PSUs and their specifications, including current, voltage, power, frequency, and connector types. | | | | | | | | | |
| | 1.3 | Explain how to determine the power requirements of a computer system based on its components. | | | | | | | | | |
| | 1.4 | Analyze PSU specifications to select an appropriate unit for various system configurations. | | | | | | | | | |
| **LO 2: Configure Power Supply Units** | 2.1 | Demonstrate safe and effective techniques for removing and installing power supply units in computer systems. | | | | | | | | | |
| | 2.2 | Connect the PSU to the motherboard, storage devices, and peripherals as per manufacturer guidelines. | | | | | | | | | |
| | 2.3 | Verify PSU functionality through post-installation tests, including voltage testing. | | | | | | | | | |
| | 2.4 | Troubleshoot any power-related issues that may arise during or after installation. | | | | | | | | | |
| **LO 3: Understand Cooling System Types and Their Applications** | 3.1 | Identify different types of cooling systems, including air cooling, liquid cooling, and passive cooling solutions. | | | | | | | | | |
| | 3.2 | Explain the principles of thermal management and the importance of maintaining optimal operating temperatures. | | | | | | | | | |
| | 3.3 | Assess the cooling requirements of a computer system based on its components and workload. | | | | | | | | | |
| | 3.4 | Explain the advantages and disadvantages of various cooling methods to determine suitability for specific applications. | | | | | | | | | |

| LEARNING OBJECTIVE (LO)<br><br>The learner will: | | PERFORMANCE CRITERIA<br><br>The learner can: | Evidence Type | | | | | Evidence Ref. Page No. | | | |
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| **LO 4: Maintain Cooling Systems** | 4.1 | Demonstrate proper techniques for installing air and liquid cooling solutions, including heatsinks and fans. | | | | | | | | | |
| | 4.2 | Configure fan speeds and settings to optimize cooling performance based on system requirements. | | | | | | | | | |
| | 4.3 | Conduct regular maintenance of cooling systems, including cleaning dust from fans using blowers and ensuring proper airflow. | | | | | | | | | |
| | 4.4 | Diagnose cooling-related issues. | | | | | | | | | |
| | 4.5 | Resolve cooling-related issues in 4.4 | | | | | | | | | |
| **LO 5: Manage Power and Cooling Efficiency** | 5.1 | Utilize monitoring tools to assess the performance and efficiency of power supply and cooling systems. | | | | | | | | | |
| | 5.2 | Analyze power consumption and temperature data to identify potential issues or areas for improvement. | | | | | | | | | |
| | 5.3 | Implement energy-saving practices to enhance the overall efficiency of computer systems. | | | | | | | | | |
| | 5.4 | Develop strategies for upgrading power and cooling systems based on evolving technology needs. | | | | | | | | | |

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| IQA's Signature | Date: |
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**NATIONAL SKILLS QUALIFICATION**

**LEVEL 3:** *COMPUTER HARDWARE REPAIRS AND MAINTENANCE*

**Unit 9: DATA STORAGE DEVICES AND BACKUP SOLUTIONS**

**Unit Reference Number: ICT/CMR/009/L3**
**NSQ Level: 3**
**Credit Value: 1**
**Guided Learning Hours (GLH): 30**

**Unit Purpose:**
*This unit is to equip learners with the knowledge and skills of data storage technologies, implement effective backup strategies, and ensure the security and integrity of data within computer systems.*

## Unit Assessment Requirements / Evidence Requirements:

Assessment must be done in a real workplace where learning and human development take place.

***Assessment methods include:***

- **Direct Observation (DO):** watching the learner perform tasks.
- **Question and Answer (QA):** asking questions to check understanding.
- **Witness Testimony (WT):** Statements from supervisors or trainers.
- **Assignments (ASS):** Written or practical tasks.

*Assessment methods may vary depending on the trade area.*

**UNIT 009: Data Storage Devices and Backup Solutions**

| LEARNING OBJECTIVE (LO)<br><br>The learner will: | | PERFORMANCE CRITERIA<br><br>The learner can: | Evidence Type | | | | | Evidence Reference Page No. | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **LO 1: Understand Different Types of Data Storage Devices** | 1.1 | Identify various types of data storage devices, including Hard Disk Drives (HDDs), Solid State Drives (SSDs), USB flash drives, and optical discs. | | | | | | | | | |
| | 1.2 | Explain the advantages and disadvantages of each storage type in terms of capacity, speed, durability, and cost. | | | | | | | | | |
| | 1.3 | Analyze the role of data storage devices in a computer system and their impact on performance. | | | | | | | | | |
| | 1.4 | Evaluate the compatibility of different storage devices with various operating systems and hardware configurations. | | | | | | | | | |
| **LO 2: Configure Data Storage Devices** | 2.1 | Demonstrate safe and effective techniques for installing and configuring different types of data storage devices. | | | | | | | | | |
| | 2.2 | Format and partition storage devices according to user needs and system requirements. | | | | | | | | | |
| | 2.3 | Configure storage settings in the operating system, including drive letters and file systems. | | | | | | | | | |
| | 2.4 | Identify a successful installation of storage devices through system recognition and performance tests. | | | | | | | | | |
| **LO 3: Implement Backup Solutions for Data Protection** | 3.1 | Identify the importance of data backups and the potential risks of data loss. | | | | | | | | | |
| | 3.2 | Evaluate various backup methods, including full, incremental, differential, and cloud-based solutions. | | | | | | | | | |
| | 3.3 | Develop a comprehensive backup strategy that meets organizational or personal data protection needs. | | | | | | | | | |
| | 3.4 | Demonstrate the implementation of backup solutions using software tools and external storage devices. | | | | | | | | | |
| **LO 4: Perform Data Recovery Techniques** | 4.1 | Discuss common causes of data loss and their implications for users. | | | | | | | | | |
| | 4.2 | Use data recovery software to recover lost or corrupt files from various storage devices. | | | | | | | | | |

| LEARNING OBJECTIVE (LO)<br><br>The learner will: | | PERFORMANCE CRITERIA<br><br>The learner can: | Evidence Type | | | | | Evidence Reference Page No. | | | |
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| | 4.3 | Use manual data recovery techniques, such as retrieval from damaged drives. | | | | | | | | | |
| | 4.4 | Document the recovery process and analyze the success of recovery efforts for future reference. | | | | | | | | | |
| **LO 5:**<br>**Know Data Security and Integrity** | 5.1 | Explain the principles of data encryption and its importance in protecting sensitive information. | | | | | | | | | |
| | 5.2 | Implement security measures for data storage devices, including access controls and physical security. | | | | | | | | | |
| | 5.3 | Conduct regular audits of storage solutions to ensure compliance with data protection policies. | | | | | | | | | |
| | 5.4 | Discuss strategies for managing and disposing of outdated or unnecessary data securely. | | | | | | | | | |

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**NATIONAL SKILLS QUALIFICATION**

**LEVEL 3:** *COMPUTER HARDWARE REPAIRS AND MAINTENANCE*

**Unit 10: Introduction to Software Interaction with Hardware**

**Unit Reference Number: ICT/CMR/010/L3**
**NSQ Level: 3**
**Credit Value: 1**
**Guided Learning Hours (GLH): 30**

**Unit Purpose:**
*This unit is to provide learners with knowledge and skills of how software communicates with and controls hardware components, enabling them to effectively manage system resources and troubleshoot issues related to software-hardware integration.*

## Unit Assessment Requirements / Evidence Requirements:

Assessment must be done in a real workplace where learning and human development take place.

***Assessment methods include:***

- **Direct Observation (DO):** watching the learner perform tasks.
- **Question and Answer (QA):** asking questions to check understanding.
- **Witness Testimony (WT):** Statements from supervisors or trainers.
- **Assignments (ASS):** Written or practical tasks.

*Assessment methods may vary depending on the trade area.*

**UNIT 010: Introduction to Software Interaction with Hardware**

| LEARNING OBJECTIVE (LO)<br><br>The learner will: | | PERFORMANCE CRITERIA<br><br>The learner can: | Evidence Type | | | | | Evidence Ref. Page No. | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **LO 1: Understand the Fundamentals of Software and Hardware Interaction** | 1.1 | Define key concepts related to software, hardware, and their interaction within a computer system. | | | | | | | | | |
| | 1.2 | Explain the roles of operating systems and drivers in facilitating communication between software and hardware components. | | | | | | | | | |
| | 1.3 | Explain the common protocols and standards used for software-hardware interaction, such as USB, SATA, and PCIe. | | | | | | | | | |
| | 1.4 | Discuss the impact of software updates on hardware functionality and performance. | | | | | | | | | |
| **LO 2: Identify and Configure Device Drivers** | 2.1 | Explain the purpose and function of device drivers in enabling hardware operation. | | | | | | | | | |
| | 2.2 | Identify various types of device drivers and their specific roles for different hardware components (e.g., speakers, printers, graphics cards. | | | | | | | | | |
| | 2.3 | Demonstrate the installation and configuration of device drivers for various hardware components. | | | | | | | | | |
| | 2.4 | Troubleshoot common driver-related issues, including conflicts and failures to recognize hardware. | | | | | | | | | |
| **LO 3: Analyse Software Resource Management Techniques** | 3.1 | Describe how operating systems manage hardware resources, including CPU scheduling, memory management, and I/O operations. | | | | | | | | | |
| | 3.2 | Analyze how software requests and utilizes system resources through APIs (Application Programming Interfaces). | | | | | | | | | |
| | 3.3 | Evaluate the performance implications of resource management strategies on system efficiency. | | | | | | | | | |
| | 3.4 | Demonstrate the ability to monitor resource usage through system tools and performance metrics. | | | | | | | | | |

| LEARNING OBJECTIVE (LO)<br><br>The learner will: | | PERFORMANCE CRITERIA<br><br>The learner can: | Evidence Type | | | | | Evidence Ref. Page No. | | | |
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| **LO 4:** Explore **Software Compatibility with Hardware** | 4.1 | Describe the compatibility of software applications with various hardware configurations and operating systems. | | | | | | | | | |
| | 4.2 | Explain common issues arising from incompatibility, such as performance degradation or software crashes. | | | | | | | | | |
| | 4.3 | Explain methods for ensuring software compatibility through updates, patches, and virtualization. | | | | | | | | | |
| | 4.4 | Conduct tests to verify that software operates correctly with installed hardware components. | | | | | | | | | |
| **LO 5:** Understand the Role of Firmware in Software-Hardware Interaction | 5.1 | Describe firmware and its significance in the operation of hardware components. | | | | | | | | | |
| | 5.2 | Explain how firmware updates can enhance hardware performance and compatibility. | | | | | | | | | |
| | 5.3 | Demonstrate the process of checking and updating firmware on various hardware devices. | | | | | | | | | |
| | 5.4 | Discuss the relationship between firmware, software, and hardware in maintaining system stability and performance. | | | | | | | | | |

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**NATIONAL SKILLS QUALIFICATION**

**LEVEL 3:** *COMPUTER HARDWARE REPAIRS AND MAINTENANCE*

**Unit 11: COMPUTER NETWORKING BASICS**

**Unit Reference Number: ICT/CMR/011/L3**
**NSQ Level: 3**
**Credit Value: 1**
**Guided Learning Hours (GLH): 30**

**Unit Purpose:**
*This unit is to provide learners with knowledge of networking concepts, technologies, and protocols and how data is transmitted across networks and effectively troubleshoot basic networking issues.*

## Unit Assessment Requirements / Evidence Requirements:

Assessment must be done in a real workplace where learning and human development take place.

***Assessment methods include:***

- **Direct Observation (DO):** watching the learner perform tasks.
- **Question and Answer (QA):** asking questions to check understanding.
- **Witness Testimony (WT):** Statements from supervisors or trainers.
- **Assignments (ASS):** Written or practical tasks.

*Assessment methods may vary depending on the trade area.*

**UNIT 011: Computer Networking Basics**

| LEARNING OBJECTIVE (LO)<br><br>The learner will: | | PERFORMANCE CRITERIA<br><br>The learner can: | Evidence Type | | | | | Evidence Ref. Page No. | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **LO 1:** Understand Fundamental Networking Concepts | 1.1 | Explain essential components of both wireless and wired networking, including Local and Wide Area Networks, Internet, nodes, protocols, and bandwidth. | | | | | | | | | |
| | 1.2 | Explain the differences between various types of networks (e.g., LAN, WAN, MAN, and PAN). | | | | | | | | | |
| | 1.3 | Describe the purpose and function of networking devices such as routers, switches, and access points. | | | | | | | | | |
| | 1.4 | Identify common logical and physical network topologies and their characteristics, including star, bus, ring, and mesh. | | | | | | | | | |
| **LO 2: Explore Networking Protocols and Standards** | 2.1 | Explain the role of networking protocols in facilitating communication between devices. | | | | | | | | | |
| | 2.2 | Describe common protocols, including TCP/IP, HTTP, FTP, and DHCP. | | | | | | | | | |
| | 2.3 | Discuss the OSI model and its seven layers, explaining the functions of each layer. | | | | | | | | | |
| | 2.4 | Explain how different protocols interact and work together to enable effective network communication. | | | | | | | | | |
| **LO 3: Understand IP Addressing and Subnetting** | 3.1 | Explain IP addressing and its significance in networking. | | | | | | | | | |
| | 3.2 | Differentiate between IPv4 and IPv6 addressing formats and their characteristics. | | | | | | | | | |
| | 3.3 | Demonstrate how to calculate subnet masks and create subnets based on given requirements. | | | | | | | | | |
| | 3.4 | Identify common IP address classes and their uses in network design. | | | | | | | | | |
| **LO 4: Configure Basic Network Connections** | 4.1 | Demonstrate the physical setup of a simple network, including connecting devices using Ethernet cables and configuring network interfaces. | | | | | | | | | |

| LEARNING OBJECTIVE (LO)<br><br>The learner will: | | PERFORMANCE CRITERIA<br><br>The learner can: | Evidence Type | | | | | Evidence Ref. Page No. | | | |
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| | 4.2 | Configure basic network settings on devices, including IP addresses, subnet masks, and gateways. | | | | | | | | | |
| | 4.3 | Explain how to share resources such as files, printers, scanners, etc. across a LAN. | | | | | | | | | |
| | 4.4 | Explain network connectivity using commands such as ping and traceroute. | | | | | | | | | |
| **LO 5: Understand Network Security Fundamentals** | 5.1 | Discuss common cybersecurity threats and vulnerabilities in computer networks, such as malware, phishing, and unauthorized access. | | | | | | | | | |
| | 5.2 | Explain the importance of implementing security measures, like awareness of social engineering attack, firewalls, encryption etc. | | | | | | | | | |
| | 5.3 | Demonstrate basic methods for securing a network, including changing default passwords and configuring firewalls. | | | | | | | | | |
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| IQA's Signature | Date: |
| EQA's Signature | Date: |

# National Skills Qualifications

FOR

# COMPUTER HARDWARE REPAIRS & MAINTENANCE

LEVEL 1, 2 & 3

Plot B, Bida Road, PMB 2239,Kaduna
ideasworldbankproject@nbte.gov.ng
Tel: +234 (0) 802 4728 042