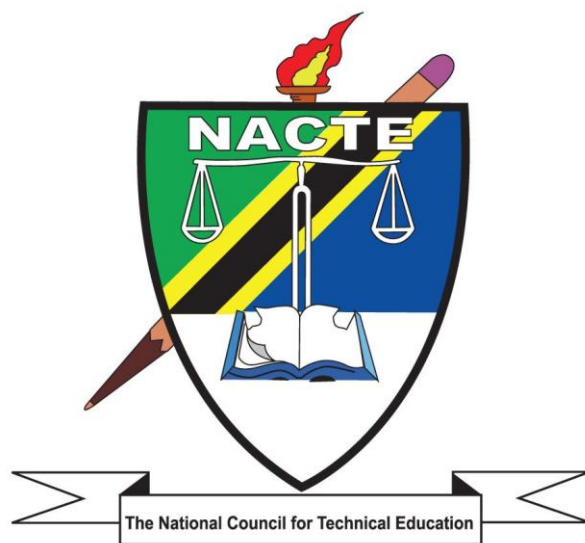**NATIONAL COUNCIL FOR TECHNICAL EDUCATION**

The National Council for Technical Education

NOVEMBER 2022

PROPOSED OCCUPATIONAL STANDARDS

FOR COMPUTER ENGINEERING TECHNICIAN

LEVEL: NTA 6

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FOREWORD

The National Council for Technical Education (NACTE) is a corporate body established by the National Council for Technical Education Act, Cap.129. The Act provides a legal framework for the Council to coordinate the provision of technical education and training in Tanzania. The mandate of NACTE is three-fold, namely; Regulatory, Quality Assurance and Policy Advisory.

In discharging its mandate, the Council has been charged with the responsibilities, among others, to:

(a) assist technical institutions in the transmission of knowledge, principles and training in the field of technical education and training for the benefit of the people of Tanzania;

(b) assist technical institutions in the overall development of the quality of education they provide and to promote and to maintain approved academic standards;

(c) establish and make awards in technical education which are consistent in standard and comparable to related awards in Tanzania and internationally; and

(d) ensure that the quality of education required for the awards is met and maintained throughout the duration of the delivery of the course.

In the course of execution of these responsibilities, the Council has been instituting various measures aiming at advancing the quality of training provided in technical institutions in respect of the changing demands of the labour market, both local and international.

To achieve the above obligation, NACTE, under the Ministry of Education, Science and Technology implemented the East Africa Skills for Transformation and Regional Integration Project (EASTRIP), a project aiming at promoting regional integration through supporting the regional corridors and sector markets, developing common standards and qualifications, and promoting mobility of students, faculty, and graduates. The project supports the Government of Tanzania to address shortage of skills in five sectors namely:

(a)   Energy;

(b)   Construction;

(c)   Information and Communication Technology (ICT);

(d)   Transportation; and

(e)   Agribusiness.

To address the skills miss-match and shortage in the five (5) sectors in the country, the project funded, among others, a component of Development of Occupational Standards for Technical and Vocational Education and Training (TVET). In this regard, NACTE endeavored to identify qualified and highly experienced experts in the five sectors from both the industry and training institutions to carry out the development of Occupational Standards. The exercise was carried out at Morogoro Teachers College – Morogoro from 16th July to 10th August, 2021. The output of the exercise is Occupational Standards for 12occupations. Occupational standards for Computer Engineering Technicians is among the 12 occupational standards which have been developed.

Since Occupational Standards are statements of work performance reflecting the ability to successfully complete the functions required in an occupation, as well as the application of knowledge, skills, attitudes and understanding in an occupation, it is the Council's expectations that the developed standards will form a robust base for decision making and provide explicit guidance to policy makers, curriculum developers, educators, employers and other stakeholders in matters related to manpower planning as well as execution of Technical and Vocational Education and Training undertakings.

Prof. J. W. Kondoro   Dar es Salaam
Chairman   **October 2022**

ACKNOWLEDGEMENT

The National Council for Technical Education (NACTE) is charged with the mandate to be the Quality Assurance organ of the Government in matters related to Technical and Vocational Education and Training (TVET) and production of qualified manpower for both local and international labour markets. In order to realize this obligation, NACTE endeavors to institute policies, guidelines and standards and to set the quality benchmarks for training institutions.

However, this is only possible if there is a strong base, linking the training institutions on one hand and the demands of the industry/labour market for relevant manpower on the other hand. Therefore, the Council undertook a step to develop Occupational Standards in sectors considered to be the engine to steer the country's desire to achieve an industrial economy. This exercise would not be a success without the input and support from our stakeholders. I am indebted to acknowledge some of them here.

I wish to acknowledge and appreciate the support from the Ministry of Education, Science and Technology through the East Africa Skills for Transformation and Regional Integration Project (EASTRIP) for the financial support which facilitated the preparation of this document. I wish also to appreciate Eng. Dr. Simon Baregu and Mrs Leah Lukindo for the tireless efforts and commitment in facilitating and guiding the standards development process, Ms. Eileen Tzamburakis and Ms. ChausikuYakweli Ibrahim for compiling and type setting the final document; and the NACTE Secretariat for coordinating the whole activity.

In a very special way I wish further to extend my sincere gratitude to this team of wonderful experts who tirelessly dedicated their time and availed their invaluable intellect in the preparation of this document. I would like to recognize the colossal inputs of the following experts:

S/N	Name	Title	Institute
1	Dr. Dennis Lupiana	Lecturer	Institute of Finance Management (IFM)
2	Eng. Dr. Moses Makoko	Head of ICT	University of Dar-es-Salaam – College of Information Communication Technology
3	Dr. Kwame Ibwe	Lecturer	University of Dar-es-Salaam – College of Information Communication Technology
4	Dr. Nkundwe Mwasaga	Lecturer	Dar-es-Salam Institute of Technology

In addition, NACTE hopes to further enhance the internationalization of occupational standards and promote the modernization and internationalization of industries, facilitating

Tanzania's integration into the international market and exploiting its development potential. Therefore, NACTE has invited China-Africa Vocational Education Alliance and China-Africa (Chongqing) Vocational Education Alliance to participate in the development, revision and review of occupational standards documents in collaboration with Chinese vocational institutions, so as to make use of their rich experience in vocational education efforts and rely on China's advanced and complete industrial chain and its position in the international market to contribute to the development of vocational education and related industries in Tanzania.

Therefore, I would like to express my sincere gratitude to this specialized team of Chinese institutions and experts. I thank them for their hard work and dedication, and for contributing their wisdom and experience to the preparation of this document. I would like to thank the following institutions and experts for their support:

1	Director Wang Decai	Professor	Weifang Engineering Vocational College
2	Director Wang Xingqin	Professor	Weifang Engineering Vocational College
3	Teacher Wang Jinlong	Associate Professor	Weifang Engineering Vocational College

Dr. A. B. Rutayuga   Dar es Salaam
Executive Secretary   **October 2022**

ABREVIATIONS

NACTE	National Accreditation Council of Technical Education
NOS	National Occupational Standards
OS	Occupational Standards
TET	Technical Education and Training
TVET	Technical and Vocational Education and Training

GLOSSARY OF TERMS

Circumstantial knowledge:	Detailed knowledge, which allows the decision-making in regard to different circumstances and cross cutting issues
Competence:	The ability to use knowledge, understanding, practical and thinking skills to perform effectively to the workplace standards required in employment.
Competency:	A description of the ability one possesses when able to perform a given occupational task effectively and efficiently.
Competency-based education:	An instructional program that derives its content from validated tasks and bases assessment on the learner's performance
Curriculum:	A description or composite of statements about "what is to be learned" by the trainee/student in a particular instructional programme; a product that states the "intended learning outcomes".
Educational/Training programme:	The complete curriculum and instruction (what and how) that is designed to prepare a person for employment in a job or other particular performance situation.
Occupation:	A specific position requiring the performance of specific tasks – essentially the same tasks are performed by all employees having the same title. (Example: baker)
Occupational analysis:	A process used to identify the tasks that are important to employees in any given occupation
Occupational area	This is a broad grouping of related jobs. Example: food service
Occupational Standards:	Specific requirements of competences people are expected to demonstrate in a particular occupational area, including knowledge and relevant attitudes. They also act as performance tool of assessment of the pre – scribed outcomes.
Occupational/job analysis:	A process used to identify the tasks that are important to employees in any given occupation.
Performance criteria:	indicate the expected end results or outcome in form of evaluative statements.
Skill:	The ability to perform occupational tasks with a high degree of proficiency within a given occupation. Skill is conceived of as

	a composite of three completely interdependent components: cognitive, affective, and psychomotor.
Standard:	it is a set of statement, which if proved true under working conditions, means that an individual is meeting an expected level and type of performance
Task analysis:	The process of analyzing each task to determine the steps, related knowledge, attitudes, performance standards, tools and materials needed, and safety concerns required of employees performing it.
Task:	A work activity that has a definite beginning and ending, is observable or measurable, consists of two or more definite steps, and leads to a product, service, or decision.
Underpinning Knowledge:	This is crucial knowledge that an individual must acquire in order to demonstrate competences that are associated in performing a given task.
Verification:	The process of having experts review and conform the importance of the task (competency) statements identified through occupational analysis. Other questions, such as the degree of task learning difficulty are also frequently asked. This process is also sometimes referred to as validation.
Occupational Competence	The application of knowledge and skills to perform consistently to the standards required in the work context.

## 1.0.	INTRODUCTION

Technical Education and Training (TET) is one of the most important education sub-sectors in Tanzania, responsible for developing a skilled workforce to support the country's industrialization economic agenda. Tanzania's Development Vision 2025 intends to raise the country's economy to a middle-income status. This requires a skilled workforce that is aligned with the needs of the public and private sectors of the economy. The National Council for Technical Education has begun the job of drafting Occupational Standards that will eventually be adopted as National Occupational Standards for TET in order to ensure that it meets the needs of the labour market and the country's economic agenda.

National Occupational Standards (NOS) are performance criteria that are matched with labour market demands. Each National Occupation Standard describes functions, performance standards, and knowledge/understanding for one important function or task. They combine skills, knowledge, and attitudes to describe best practice. They are useful tools for establishing job roles, personnel recruiting, supervision, and appraisal, as well as TET standards. They're also helpful for benchmarking and harmonizing qualifications on a national and international level. Standards, in general, provide a solid framework for high-quality TET that is labour market-relevant, current and consistent in delivery across all public and private institutions.

However, it must be noted that, Occupational Standards and Training standards/qualifications standards are different. Occupational standards are defined in terms of activities performed by a person in a selected occupation (e.g., an electrical engineer designs electrical wiring circuits, performs trouble shooting in electrical wiring, etc.) and they are usually defined by employers following procedures agreed upon by all stakeholders. Education and training standards are developed from the activities defined in occupational standards, and they include learning objectives to ensure that the necessary skills and knowledge are developed in a person to enable him or her to function at an agreed level in an occupation. Education and Training standards are used to define curricula in training institutions. It is however critical that there must be a direct link between the occupational standards and the training standards to respond to demands of the labour market.

In TET delivery, Tanzania adopted the Competence Based Education (CBET) approach. The CBET approach focuses on providing learners with the skills and knowledge required to meet the occupational standards. Occupational standards are thus the starting point for developing competency-based training (CBET) programs. TET institutions will be required to benchmark their curricula with relevant occupational standards.

Occupational Standards are developed based on a given occupation's current and future demands. As a result, they serve as a means of bridging the gap between the worlds of employment and technical education and training (TET).

The Computer Engineering technician occupation has its own set of occupational standards. The document explains how the occupational standards were developed, as well as the scope, the occupational profile in the form of DACUM charts, and the Occupational Standards.

2.0. OCCUPATIONAL STANDARD DEVELOPMENT PROCESS

The Occupational standards development process began with an examination of major documents that guide Tanzanian skill development. The 10-year National Skills Development Strategy (2016-2026) was one of the documents reviewed, and it outlined six (6) economic sectors that should be prioritized when developing skills development programmes. These sectors include: Transport and logistics, Tourism and Hospitality, Agribusiness, Construction, Energy and ICT. NACTE labour market reports were also used in the literature review to determine the skills demand in the Tanzanian labour market as a whole.

After the literature review, a workshop comprised of expert workers and educators with substantial knowledge and experience in the occupation conducted an occupational analysis utilizing the DACUM approach to produce the occupational profile. The analysis resulted in DACUM Charts, which are attached as **Appendix 1** to this document.

The workshop thereafter continued with the development of occupational standards. Experts in Occupational Analysis and development of Occupational Standards facilitated the workshop. Interviews, online surveys, and a stakeholder forum were used to validate the occupational standards. Engineers, supervisory technicians on the job, and experienced Computer Maintenance technicians were key informants in the survey to establish occupational trends. This information was used to gain insight from the workplaces regarding trends and changes in the profession, including how well graduates are equipped for working in the occupation. A total of ……….. online surveys were completed by experts from the labour market across the country. Apart from the survey aiding in defining the scope for the occupational analysis, they served to engage a wide cross-section of experts in the

occupation. The stakeholders' forum was attended by ……. participants from different parts of the country representing various companies.

3.0. THE SCOPE AND OVERVIEW OF THE OCCUPATION STANDARDS FORCOMPUTER ENGINEERING TECHNICIAN

These standards cover a broad range of duties and tasks that can be performed by a Computer Engineering Technician. However, the occupational standards are not meant to replace individual job descriptions, they are to be used for guidance in defining skill levels and knowledge for the technician in specific settings or positions. The Computer Engineering Technician may perform tasks in a number of key areas of the occupational standards, but not necessarily in all areas. The most common job titles in this cadre include (i) Programmer/Analyst, (ii) System/Network Administrator, (iii) System Security expert, (iv) System Testing Technician, etc.

Computer engineering technicians assist engineers in the design of computer hardware and software, as well as apply science and engineering principles in the implementation of designs. Generally, computer engineering technicians apply knowledge of computer principles to implement the designs of hardware and software engineers. Technicians perform calculations and projections to help create designs, build and test prototypes to improve their designs and conduct quality control in production environments. On the other hand, computer technicians, also known as computer support specialists, don't only design, build, or improve computer parts or systems, but troubleshoot and repair those already in place as well..

These occupational standards cover the following main duties for a Computer Engineering Technician:

1. Maintain computer hardware and accessories in a business environment
2. Maintain software in standalone computers
3. Provide user technical support
4. Build prototypes of planned ICT systems
5. Maintain electronic circuits of computer devices
6. Manage computer networks in a business with a single office environment
7. Improve data processing and management
8. Participate in preparation of procurement plan of ICT systems and services
9. Manage computer users in a business environment

10. Maintain network-based services (e.g. network file sharing, network printing and data backup)

11. Prepare records of daily operations

4.0. VALIDITY PERIOD

The occupational standards will be valid for 3-5 years due to the fast-changing nature of technology. The review will proceed in the same manner as the previous one, with new occupational standards being developed based on current labor market Information.

5.0. OCCUPATIONAL STANDARDS

5.1 OCCUPATIONAL STANDARDS FOR COMPUTER ENGINEERING TECHNICIAN – NTA 6

OCCUPATION	COMPUTER ENGINEERING TECHNICIAN	OCCUPATION CODE	
DUTY TITLE	PARTICIPATE IN PREPARATION OF PROCUREMENT PLAN OF ICT SYSTEMS AND SERVICES	DUTY NO	601
TASK TITLE	PARTICIPATE IN IDENTIFYING EXISTING AND REQUIRED ICT SYSTEMS AND SERVICES	TASK NO	6011
Performance Criteria:	A person performing this task must be able to identify existing and required ICT systems and services as per industry standards, and procurement guideline and plan.		
Range Statements:	This task can be performed in a workshop or in a client's office. The following equipment and tools should be available: 1. Procurement guideline 2. Procurement Plan 3. Procurement strategies 4. Computer system This person will work under minimum supervision.		

EVIDENCE REQUIREMENTS

PRACTICAL PERFORMANCE	UNDERPINNING KNOWLEDGE
The person performing this task must be able to do the following: 1. Select tools, equipment and safety gear 2. Identify ICT systems 3. Diagnose ICT systems 4. Identify defective ICT systems 5. Identify obsolete ICT systems 6. Identify user requirements 7. List required ICT systems and services 8. Store tools and equipment	**Detailed knowledge about:** **1.0. Methods** The person performing this task must be able to explain how to: 1.1. Identify user requirements 1.2. ICT systems 1.3. Defective ICT systems 1.4. Obsolete ICT systems 1.5. Diagnose ICT systems 1.6. Identify ICT system procurement strategies **2.0. Principles** The person must be able to explain the principles of: 2.1. Identifying user requirements 2.2. ICT systems 2.3. Defective ICT systems 2.4. Obsolete ICT systems 2.5. Diagnosing ICT systems 2.6. Formulating ICT system procurement strategies **3.0. Theories** The person must be able to explain: 3.1. Types of ICT systems 3.2. Diagnosis of ICT systems **4.0. Essential skills** 4.1. Problem solving skills 4.2. Communication skills

	4.3. Report writing skills 4.4. Analytical skills 4.5. Interpersonal skills 4.6. Teamwork **5.0. Math skills** 5.1. Algebra
Description of End Product or Service:	Existing and required ICT systems and services are identified as per industry standards, and procurement guideline and plan.
Circumstantial Knowledge:	**Detailed knowledge about:** 1. Safe handling of computer system 2. Safe handling of software 3. Extent of responsibilities

OCCUPATION	COMPUTER ENGINEERING TECHNICIAN	OCCUPATION CODE	
DUTY TITLE	PARTICIPATE IN PREPARATION OF PROCUREMENT PLAN OF ICT SYSTEMS AND SERVICES	DUTY NO	601
TASK TITLE	PREPARE SPECIFICATIONS FOR THE REQUIRED SYSTEMS AND SERVICES	TASK NO	6012
Performance Criteria:	A person performing this task must be able to prepare specifications for the required systems and services as per industry standards, and procurement guideline and plan.		
Range Statements:	This task can be performed in a workshop or in a client's office. The following equipment and tools should be available: 1. Procurement guideline 2. Procurement Plan 3. Computer system This person will work under minimum supervision.		

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EVIDENCE REQUIREMENTS

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PRACTICAL PERFORMANCE	UNDERPINNING KNOWLEDGE
The person performing this task must be able to do the following: 1. Interpret user requirements 2. Identify specifications 3. List specifications 4. Adjust specifications	**Detailed knowledge about:** **1.0. Methods** The person performing this task must be able to explain how to: 1.1. Interpret user requirements 1.2. Identify specifications 1.3. Identify specifications 1.4. Adjust specifications **2.0. Principles** The person must be able to explain the principles of: 2.1. Interpretation user requirements 2.2. Identifying specifications 2.3. Identifying specifications 2.4. Adjusting specifications **3.0. Theories** The person must be able to explain: 3.1. Types of interpretation of user requirements 3.2. Identifying specifications of ICT systems 3.3. Adjusting specifications based on actual ICT system requirements **4.0. Essential skills** 4.1. Problem solving skills 4.2. Communication skills 4.3. Report writing skills

	4.4. Analytical skills
	4.5. Interpersonal skills
	4.6. Teamwork
	5.0. Math skills
	5.1. Algebra
Description of End Product or service:	Specifications for the required systems and services are prepared as per industry standards, and procurement guideline and plan.
Circumstantial Knowledge:	**Detailed knowledge about:**
	1. Safe handling of computer system
	2. Safe handling of software
	3. Extent of responsibilities

OCCUPATION	COMPUTER ENGINEERING TECHNICIAN	OCCUPATION CODE	
DUTY TITLE	PARTICIPATE IN PREPARATION OF PROCUREMENT PLAN OF ICT SYSTEMS AND SERVICES	DUTY NO	601
TASK TITLE	PREPARE ESTIMATED COSTS FOR THE SYSTEMS AND SERVICES TO BE PROCURED	TASK NO	6013
Performance Criteria:	A person performing this task must be able to prepare estimated costs for the systems and services to be procured as per industry standards, budget guideline, and procurement guideline and plan.		
Range Statements:	This task can be performed in a workshop or in a client's office. The following equipment and tools should be available: 1. Procurement guideline 2. Budget guideline 3. Procurement Plan 4. Computer system This person will work under minimum supervision.		
EVIDENCE REQUIREMENTS			
PRACTICAL PERFORMANCE	UNDERPINNING KNOWLEDGE		
The person performing this task must be able to do the following: 1. Identify system and services to be procured 2. Outline specifications 3. Prepare indicative prices 4. Compile a procurement list	**Detailed knowledge about:** **1.0. Methods** The person performing this task must be able to explain how to: 1.1. Prepare specifications of procured systems and services 1.2. Prepare indicative prices 1.3. Compile a procurement list **2.0. Principles** The person must be able to explain the principles of: 2.1. Preparation of specifications of procured systems and services 2.2. Identification of indicative prices 2.3. Compilation of procurement list **3.0. Theories** The person must be able to explain: 3.1. Types of preparation of specification of computer services and systems 3.2. Compilation of procurement list **4.0. Essential skills** 4.1. Problem solving skills		

	4.2. Communication skills
	4.3. Report writing skills
	4.4. Analytical skills
	4.5. Interpersonal skills
	4.6. Teamwork
	5.0. Math skills
	5.1. Algebra
Description of End Product or Service:	Estimated costs for the systems and services to be procured are prepared as per industry standards, budget guideline, and procurement guideline and plan.
Circumstantial Knowledge:	**Detailed knowledge about:**
	1. Safe handling of computer system
	2. Safe handling of software
	3. Extent of responsibilities

OCCUPATION	COMPUTER ENGINEERING TECHNICIAN	OCCUPATION CODE	
DUTY TITLE	MANAGE COMPUTER USERS IN A BUSINESS ENVIRONMENT	DUTY NO	602
TASK TITLE	CREATE USER ACCOUNTS	TASK NO	6021
Performance Criteria:	A person performing this task must be able to create user accounts as per industry standards and system administration guideline.		
Range Statements:	This task can be performed in a workshop or in a client's office. The following equipment and tools should be available: 1. Operating Systems resource monitors 2. System administration guideline 3. Computer system This person will work under minimum supervision.		
EVIDENCE REQUIREMENTS			
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**		
The person performing this task must be able to do the following: 1. Install Operating Systems 2. Identify new users 3. Add user accounts 4. Add group of users using scripts 5. Document changes made	**Detailed knowledge about:** **1.0. Methods** The person performing this task must be able to explain how to: 1.1. Install Operating Systems 1.2. Identify new users 1.3. Add user accounts **2.0. Principles** The person must be able to explain the principles of: 2.1. Installing Operating Systems 2.2. Identifying new users 2.3. Managing user accounts **3.0. Theories** The person must be able to explain: 3.1. Types of group of users 3.2. Creating user group **4.0. Essential skills** 4.1. Problem solving skills 4.2. Communication skills 4.3. Report writing skills 4.4. Analytical skills 4.5. Interpersonal skills 4.6. Teamwork		

	5.0. Math skills: 5.1. Algebra
Description of End Product or Service:	User accounts are created as per industry standards and system administration guideline.
Circumstantial Knowledge:	**Detailed knowledge about:** 1. Safe handling of computer system 2. Safe handling of software 3. Extent of responsibilities

OCCUPATION	COMPUTER ENGINEERING TECHNICIAN	OCCUPATION CODE	
DUTY TITLE	MANAGE COMPUTER USERS IN A BUSINESS ENVIRONMENT	DUTY NO	602
TASK TITLE	GRANT USER PERMISSIONS AND RIGHTS	TASK NO	6022
Performance Criteria:	A person performing this task must be able to grant user permissions and rights as per industry standards and system administration guideline.		
Range Statements:	This task can be performed in a workshop or in a client's office. The following equipment and tools should be available: 1. Operating Systems resource monitors 2. System administration guideline 3. Computer system This person will work under minimum supervision.		

<table>
<tr><td colspan="2" align="center">EVIDENCE REQUIREMENTS</td></tr>
<tr><td>PRACTICAL PERFORMANCE</td><td>UNDERPINNING KNOWLEDGE</td></tr>
<tr><td>

The person performing this task must be able to do the following:
1. Gather users' rights from administration
2. Assign users' permission in the system
3. Review users' permissions and rights
4. Document changes made

</td><td>

Detailed knowledge about:
1.0. Methods
The person performing this task must be able to explain how to:
1.1. Gather users' rights from administration
1.2. Assign users' permission in the system
1.3. Review users' permissions and rights

2.0. Principles
The person must be able to explain the principles of:
2.1. Gathering users' rights from administration
2.2. Assigning users' permission in the system
2.3. Managing users' permissions and rights

3.0. Theories
The person must be able to explain:
3.1. Types of users' permissions and rights
3.2. Managing users' permissions and rights

4.0. Essential skills
4.1. Problem solving skills
4.2. Communication skills
4.3. Report writing skills
4.4. Analytical skills
4.5. Interpersonal skills
4.6. Teamwork

5.0. Math skills
5.1. Algebra

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Description of End Product or Service:	User permissions and rights are granted as per industry standards and system administration guideline.
Circumstantial Knowledge:	**Detailed knowledge about:** 1. Safe handling of computer system 2. Safe handling of software 3. Extent of responsibilities

OCCUPATION	COMPUTER ENGINEERING TECHNICIAN	OCCUPATION CODE	
DUTY TITLE	MANAGE COMPUTER USERS IN A BUSINESS ENVIRONMENT	**DUTY NO**	602
TASK TITLE	REVOKE USER PERMISSIONS AND RIGHTS	**TASK NO**	6023
Performance Criteria:	A person performing this task must be able to revoke user permissions and rights as per industry standards and system administration guideline.		
Range Statements:	This task can be performed in a workshop or in a client's office. The following equipment and tools should be available: 1. Operating Systems resource monitors 2. System administration guideline 3. Computer system 4. Antivirus program for installation 5. Antivirus program for use This person will work under minimum supervision.		

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EVIDENCE REQUIREMENTS

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PRACTICAL PERFORMANCE	UNDERPINNING KNOWLEDGE
The person performing this task must be able to do the following: 1. Obtain permission from administration 2. Verify privilege levels 3. Remove users' permission and rights 4. Document changes made 5. Install antivirus programs 6. Use antivirus programs for software permission detection	**Detailed knowledge about:** **1.0. Methods** The person performing this task must be able to explain how to: 1.1. Obtain permission from administration 1.2. Verify privilege levels 1.3. Remove users' permission and rights 1.4. Use antivirus programs for software permission management **2.0. Principles** The person must be able to explain the principles of: 2.1. Administration of permission 2.2. Verifying permission levels 2.3. Using antivirus programs for software permission detection **3.0. Theories** The person must be able to explain: 3.1. Types of administration of permission 3.2. Verifying permission levels 3.3. Using antivirus programs for software permission detection **4.0. Essential skills** 4.1. Problem solving skills 4.2. Communication skills

	4.3. Report writing skills
	4.4. Analytical skills
	4.5. Interpersonal skills
	4.6. Teamwork
	5.0. Math skills
	5.1. Algebra
Description of End Product or Service:	User permissions and rights are revoked as per industry standards and system administration guideline.
Circumstantial Knowledge:	**Detailed knowledge about:**
	1. Safe handling of computer system
	2. Safe handling of software
	3. Extent of responsibilities

OCCUPATION	COMPUTER ENGINEERING TECHNICIAN	OCCUPATION CODE	
DUTY TITLE	MANAGE COMPUTER USERS IN A BUSINESS ENVIRONMENT	DUTY NO	602
TASK TITLE	ADMINISTER GROUP AND SECURITY POLICIES	TASK NO	6024
Performance Criteria:	A person performing this task must be able to administer group and security policies as per industry standards and system administration guideline.		
Range Statements:	This task can be performed in a workshop or in a client's office. The following equipment and tools should be available: 1. Operating Systems resource monitors 2. System administration guideline 3. Computer system This person will work under minimum supervision.		
EVIDENCE REQUIREMENTS			
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**		
The person performing this task must be able to do the following: 1. Secure list of legitimate users from administration 2. Detect ghost users 3. Apply group policies 4. Apply security policies 5. Use antivirus programs for software permission detection	**Detailed knowledge about:** **1.0. Methods** The person performing this task must be able to explain how to: 1.1. Secure list of legitimate users from administration 1.2. Detect ghost users 1.3. Apply group policies 1.4. Apply security policies 1.5. Use antivirus programs for software permission detection **2.0. Principles** The person must be able to explain the principles of: 2.1. Securing list of legitimate users from administration 2.2. Managing user group and security policies 2.3. Using antivirus programs for software permission detection **3.0. Theories** The person must be able to explain: 3.1. Types of legitimate users from administration 3.2. Applying user group and security policies **4.0. Essential skills** 4.1. Problem solving skills 4.2. Communication skills 4.3. Report writing skills		

	4.4. Analytical skills
	4.5. Interpersonal skills
	4.6. Teamwork
	5.0. Math skills
	5.1. Algebra
Description of End Product or Service:	Group and security policies are administered as per industry standards and system administration guideline.
Circumstantial Knowledge:	**Detailed knowledge about:**
	1. Safe handling of computer system
	2. Safe handling of software
	3. Extent of responsibilities

OCCUPATION	COMPUTER ENGINEERING TECHNICIAN	OCCUPATION CODE	
DUTY TITLE	MAINTAIN NETWORK-BASED SERVICES (E.G. NETWORK FILE SHARING, NETWORK PRINTING AND DATA BACKUP)	DUTY NO	603
TASK TITLE	SETUP NETWORK-BASED SERVICES	TASK NO	6031
Performance Criteria:	A person performing this task must be able to setup network-based services as per industry standards and system administration guideline.		
Range Statements:	This task can be performed in a workshop or in a client's office. The following equipment and tools should be available: 1. Operating Systems resource monitors 2. System administration guideline 3. User profiles 4. User management manual 5. Computer system 6. Local area network 7. Router This person will work under minimum supervision.		

<div align="center">EVIDENCE REQUIREMENTS</div>

PRACTICAL PERFORMANCE	UNDERPINNING KNOWLEDGE
The person performing this task must be able to do the following: 1. Identify network-based services needs 2. List the needs 3. Propose support hardware and software 4. Secure support technologies 5. Set up network 6. Configure a local area network 7. Configure a router	**Detailed knowledge about:** **1.0. Methods** The person performing this task must be able to explain how to: 1.1. Identify network-based services needs 1.2. Propose support hardware and software 1.3. Secure support technologies 1.4. Set up network 1.5. Configure a local area network 1.6. Configure a router **2.0. Principles** The person must be able to explain the principles of: 2.1. Identifying network-based services needs 2.2. Supporting hardware and software 2.3. Securing support technologies 2.4. Setting up network 2.5. Configure a local area network 2.6. Configure a router **3.0. Theories** The person must be able to explain: 3.1. Types of network-based services

	3.2. Setting up network
	3.3. Configure a local area network
	3.4. Configure a router
	4.0. Essential skills
	4.1. Problem solving skills
	4.2. Communication skills
	4.3. Report writing skills
	4.4. Analytical skills
	4.5. Interpersonal skills
	4.6. Teamwork
	5.0. Math skills
	5.1. Algebra
Description of End Product or Service:	Network-based services are set and functioning as per industry standards and network administration guideline.
Circumstantial Knowledge:	**Detailed knowledge about:** 1. Safe handling of computer system 2. Safe handling of software 3. Extent of responsibilities

OCCUPATION	COMPUTER ENGINEERING TECHNICIAN	OCCUPATION CODE	
DUTY TITLE	MAINTAIN NETWORK-BASED SERVICES (E.G. NETWORK FILE SHARING, NETWORK PRINTING AND DATA BACKUP)	DUTY NO	603
TASK TITLE	CONFIGURE NETWORK-BASED SERVICES	TASK NO	6032
Performance Criteria:	A person performing this task must be able to configure network-based services as per industry standards and system administration guideline.		
Range Statements:	This task can be performed in a workshop or in a client's office. The following equipment and tools should be available: 1. Operating Systems resource monitors 2. System administration guideline 3. User profiles 4. User management manual 5. Computer system 6. Computer technician's tool kit This person will work under minimum supervision.		

<div align="center">EVIDENCE REQUIREMENTS</div>

PRACTICAL PERFORMANCE	UNDERPINNING KNOWLEDGE
The person performing this task must be able to do the following: 1. Identify user requirements 2. Identify network-based services 3. Identify involved ICT systems and services 4. Customize settings of the involved ICT systems and services 5. Check the customized settings	**Detailed knowledge about:** **1.0. Methods** The person performing this task must be able to explain how to: 1.1. Identify user requirements, network-based services, and ICT systems and services 1.2. Customize settings of the involved ICT systems and services 1.3. Verify the customized settings **2.0. Principles** The person must be able to explain the principles of: 2.1. Identifying user requirements, network-based services, and ICT systems and services 2.2. Verifying the customized settings **3.0. Theories** The person must be able to explain: 3.1. Types of customization of network settings 3.2. Verifying the customized settings **4.0. Essential skills** 4.1. Problem solving skills 4.2. Communication skills

	4.3. Report writing skills
	4.4. Analytical skills
	4.5. Interpersonal skills
	4.6. Teamwork
	5.0. Math skills
	5.1. Algebra
Description of End Product or Service:	Network-based services are configured and functioning as per industry standards and network administration guideline.
Circumstantial Knowledge:	**Detailed knowledge about:**
	1. Safe handling of computer system
	2. Safe handling of software
	3. Extent of responsibilities

OCCUPATION	COMPUTER ENGINEERING TECHNICIAN	OCCUPATION CODE	
DUTY TITLE	MAINTAIN NETWORK-BASED SERVICES (E.G. NETWORK FILE SHARING, NETWORK PRINTING AND DATA BACKUP)	DUTY NO	603
TASK TITLE	TROUBLESHOOT NETWORK-BASED SERVICES	TASK NO	6033
Performance Criteria:	A person carrying out this task must be able to trace and correct faults in network based services as per industry standards, designers' manuals and manufactures' manuals		
Range Statements:	This task can be performed in a workshop or in a client's office. The following equipment and tools should be available: 1. Designers' manuals 2. Manufacturers' manuals 3. Computer 4. Computer technician's toolkit 5. Relevant software tools 6. Relevant equipment This person will work under minimum supervision.		

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<tr><td colspan="2" align="center">EVIDENCE REQUIREMENTS</td></tr>
<tr><td>PRACTICAL PERFORMANCE</td><td>UNDERPINNING KNOWLEDGE</td></tr>
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The person performing this task must be able to do the following:

Identify troubleshooting tools
Diagnose network-based services
Repair network-based services
Verify repairs
Create network troubleshooting report
Clean work place
Store tools and equipment
Network cable making

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Detailed knowledge about:

1.0. Methods

The person performing this task must be able to explain how to:

1.1. Identify different tools that are used in network troubleshooting

1.2. Verify if there is a fault in a network

1.3. Look for and locate faults in the network

1.4. Fix faults in networks

1.5. Check if faults are repaired

1.6. Document the fault

2.0. Principles

The person must be able to explain the principles of:

2.1. Network troubleshooting

3.0. Theories

The person must be able to explain:

3.1. Types of Networks

3.2. Network assessment methodologies

3.3. Network repairing tools

3.4. Network cable making

4.0. Essential skills
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	4.1. Problem solving skills
	4.2. Communication skills
	4.3. Report writing skills
	4.4. Analytical skills
	4.5. Interpersonal skills
	4.6. Teamwork
	5.0. Math skills
	5.1. Algebra
Description of End Product or Service:	Faults in network based services are traced and corrected as per industry standards, designers' manuals and manufactures' manuals
Circumstantial Knowledge:	**Detailed knowledge about:**
	1. Network devices and tools
	2. Switching and Cabling
	3. Extent of responsibilities

OCCUPATION	COMPUTER ENGINEERING TECHNICIAN	OCCUPATION CODE	
DUTY TITLE	PREPARE RECORDS OF DAILY OPERATIONS	DUTY NO	604
TASK TITLE	CREATE RECORDS OF OPERATIONS	TASK NO	6041
Performance Criteria:	A person carrying out this task must be able to create records of ICT operations as per industry standards and instruction manuals		
Range Statements:	This task can be achieved in a workshop or in a client's office. The following materials and tools must be available: 1. Designers' manuals 2. Manufacturers' manuals 3. Computer 4. Logbooks 5. Ledgers 6. Relevant software tools 7. Computer technician's tool kit This person will work under minimum supervision.		

<div align="center">EVIDENCE REQUIREMENTS</div>

PRACTICAL PERFORMANCE	UNDERPINNING KNOWLEDGE
The person performing this task must be able to do the following: 1. Capture the operation information 2. Prepare logbooks 3. Verify information correctness and completeness 4. Save the information into record ledger 5. Clean workplace	**Detailed knowledge about:** **1.0. Methods** The person performing this task must be able to explain how to: 1.1. Capture information in notebooks 1.2. Record work information in logbooks 1.3. Check and verify recorded information 1.4. Organize information in the ledger 1.5. Present information to another person **2.0. Principles** The person must be able to explain the principles of: Recording technical information **3.0. Theories** The person must be able to explain: 3.1. Information recording 3.2. Reports writing 3.3. Reports review **4.0. Essential skills** 4.1. Problem solving skills 4.2. Communication skills 4.3. Report writing skills 4.4. Analytical skills 4.5. Interpersonal skills

	4,6, Teamwork **5.0. Math skills** 5.1. Algebra
Description of End Product or Service:	Records of ICT operations are created as per industry standards and instruction manuals
Circumstantial Knowledge:	**Detailed knowledge about:** 1. Recording the work done 2. Writing reports 3. Using computer 4. Extent of responsibilities

OCCUPATION	COMPUTER ENGINEERING TECHNICIAN	OCCUPATION CODE	
DUTY TITLE	PREPARE RECORDS OF DAILY OPERATIONS	DUTY NO	604
TASK TITLE	CONSOLIDATE DAILY ACTIVITIES	TASK NO	6042
Performance Criteria:	A person carrying out this task must be able to organize daily activities as per industry standards, designers' manuals and manufactures' manuals		
Range Statements:	This task can be achieved in a workshop or in a client's office. The following materials and tools must be available: 1. Designers' manuals 2. Manufacturers' manuals 3. Computer 4. Note books 5. Relevant software tools 6. Log books This person will work under minimum supervision.		

<div align="center">EVIDENCE REQUIREMENTS</div>

PRACTICAL PERFORMANCE	UNDERPINNING KNOWLEDGE
The person performing this task must be able to do the following: 1. Identify operation record 2. List records 3. Organize and review records 4. Maintain records	**Detailed knowledge about:** **1.0. Methods** The person performing this task must be able to explain how to: 1.1. Differentiate operations 1.2. Explain the operations 1.3. Record operation activities 1.4. Organize operation activities 1.5. Review operations record 1.6. Update and improve the daily records **2.0. Principles** The person must be able to explain the principles of: 2.1. Organizing records of daily operations **3.0. Theories** The person must be able to explain: 3.1. Information recording 3.2. Reports writing 3.3. Reports review **4.0. Essential skills** 4.1. Problem solving skills 4.2. Communication skills 4.3. Report writing skills 4.4. Analytical skills

	4.5. Interpersonal skills 4.6. Teamwork **5.0. Math skills** 5.1. Algebra
Description of End Product or Service:	Daily activities are organized as per industry standards, designers' manuals and manufactures' manuals
Circumstantial Knowledge:	**Detailed knowledge about:** 1. Recording the work done 2. Writing reports 3. Using computer 4. Extent of responsibilities

OCCUPATION	COMPUTER ENGINEERING TECHNICIAN	OCCUPATION CODE	
DUTY TITLE	PREPARE RECORDS OF DAILY OPERATIONS	DUTY NO	604
TASK TITLE	PREPARE REPORT	TASK NO	6043
Performance Criteria:	A person carrying out this task must be able to prepare reports of ICT operations as per industry standards and instruction manuals		
Range Statements:	This task can be achieved in a workshop or in a client's office. The following items and tools should be available: 1. Designers' manuals 2. Manufacturers' manuals 3. Computer 4. Institution's manual 5. Relevant reporting software tools 6. Report books This person will work under minimum supervision.		
	EVIDENCE REQUIREMENTS		
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**		
The person performing this task must be able to do the following: 1. Secure record logbooks 2. Summarize daily records 3. Compile daily operation report 4. Apply office software	**Detailed knowledge about:** **1.0. Methods** The person performing this task must be able to explain how to: 1.1. Read information from logbooks 1.2. Read information from ledgers 1.3. Summarize information from different sources 1.4. Prepare reports 1.5. Present reports **2.0. Principles** The person must be able to explain the principles of: 2.1. Engineering reports writing 2.2. Office software application technology **3.0. Theories** The person must be able to explain: 3.1. Information recording 3.2. Reports writing 3.3. Reports review 3.4. Office software application **4.0. Essential skills** 4.1. Problem solving skills 4.2. Communication skills 4.3. Report writing skills 4.4. Analytical skills 4.5. Interpersonal skills		

	4.6. Teamwork **5.0. Math skills:** 5.1. Algebra
Description of End Product or service:	Reports of ICT operations are prepared as per industry standards and instruction manuals
Circumstantial Knowledge:	**Detailed knowledge about:** 1. Recording the work done 2. Writing reports 3. Using computer 4. Extent of responsibilities

TABLE 1: DACUM CHARTS FOR COMPUTER ENGINEERING TECHNICIAN LELVEL 6

DUTIES	TASKS	ENABLERS
1.0. Participate in preparation of procurement plan of ICT systems and services	1.1. Participate in identifying existing and required ICT systems and services 1.2. Prepare specifications for the required systems and services 1.3. Prepare estimated costs for the systems and serviced to be procured 1.4. Prepare specifications 1.5. Create prototype 1.6. Upgrade software 1.7. Uninstall software 1.8. Update software 1.9. Repair Electronic circuits 1.10. Fix electronic circuits 1.11. Reconstruct Electronic Circuits 1.12. Repair computer hardware and accessories 1.13. Upgrade computer hardware and accessories	**Generic Skills and Knowledge** • Basic computer skills on hardware and software • Basic knowledge on electronics • Skills and knowledge in testing, recording and interpretation of findings in computer systems • Communication and report writing skills • Analytical skills **Tools and Equipment** • Antistatic wrist strap • Digital multi-meter • LAN tester • Screw drivers • Thermal paste • Pliers and Tweezers • Windows performance monitor • Safety gears **Work Behaviors** • Team work • Time management
1.0. Manage computer users in a business environment	1.1. Create user accounts 1.2. Grant user permissions and rights 1.3. Revoke user permissions and rights 1.4. Administer group and security policies 1.5. Configure computer	**Generic Skills and Knowledge** • Basic skills on Operating Systems • Basic skills on Cyber Security • Basic skills on scripting languages • Communication and report

DUTIES	TASKS	ENABLERS
	network active devices	writing skills • Analytical skills • Problem solving skills • Ethical skills **Tools and Equipment** • Operating Systems resource monitors **Materials** • User profiles • User management manual **Work Behaviors** • Team work • Time management
	1.6. Repair computer network devices	
	1.7. Troubleshoot computer networks	
	1.8. Upgrade computer network devices	
2.0. Maintain network-based services (e.g. network file sharing, network printing and data backup)	2.1. Setup network-based services	**Generic Skills and Knowledge** • Basic skills on Operating Systems • Basic skills on Cyber Security • Basic skills on scripting languages • Communication and report writing skills • Analytical skills • Problem solving skills • Ethical skills **Tools and Equipment** • Operating Systems resource monitors **Materials** • User profiles • User management manual **Work Behaviors** • Team work • Time management
	2.2. Configure network-based services	
	2.3. Troubleshoot network-based services	
	2.4. Document final results 2.5. Obtain feedback from user	
3.0. Prepare records of daily operations	3.1. Create records of operations 3.2. Consolidate daily activities	**Generic Skills and Knowledge**

DUTIES	TASKS	ENABLERS
	3.3. Prepare report	• Skills on database technologies • Skills on computer networks • Skills on hardware • Basic skills on Operating Systems • Basic skills on Cyber Security • Basic skills on scripting languages • Communication and report writing skills • Analytical skills • Problem solving skills • Ethical skills **Tools and Equipment** • Diagnostic tools • Technician toolbox • MySQL. • SQL Server Management Studio. • DevOpsTools • Visual Studio Code • Enterprise Service Management (ESM) Tools. • PhpMyAdmin Tool. • Security protection software • Antivirus program • Twisted pair • Computer **Materials** • Data **Work Behaviors** • Patience • Meticulous attention to detail • A logical approach to work