THE NATIONAL COUNCIL FOR TECHNICAL AND VOCATIONAL EDUCATION AND TRAINING
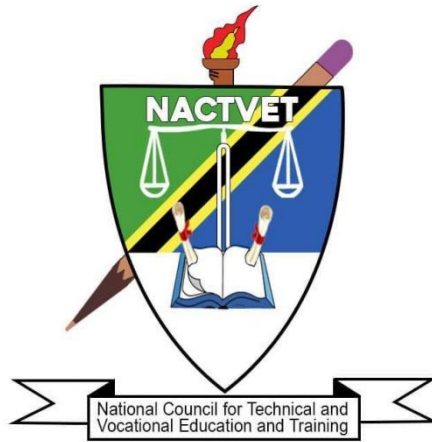

National Council for Technical and Vocational Education and Training

OCCUPATIONAL STANDARDS

OCCUPATION: MOBILE APPLICATION DEVELOPMENT TECHNICIAN

LEVEL: NTA LEVEL 4

FEBRUARY 2024

TABLE OF CONTENTS

ABBREVIATIONS

APP	Application
CDN	Content Delivery Network
CBET	Competency Based Education and Training
GCC	GNU Compiler Collection
HTTP	Hypertext Transfer Protocol
JDK	Java Development Kit
JSON	JavaScript Object Notation
NACTVET	National Council for Technical and Vocational Education and Training
NOS	National Occupational Standards
OS	Occupational Standards
TET	Technical Education and Training
TVET	Technical and Vocational Education and Training
URL	Uniform Resource Locator
UI	User Interface

GLOSSARY OF TERMS

Circumstantial Kknowledge:	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 programme 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 Area:	This is a broad grouping of related jobs. (Example: food service)
Occupational Competence:	The application of knowledge and skills that consistently meet the standards required by the work context.
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 a performance tool of assessment of the prescribed outcomes.
Occupational/Job Analysis:	A process used to identify the tasks that are important to employees in any given occupation.
Performance Criteria:	Indicate expected end results or outcomes in the form of evaluative statements.
Skills:	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.

Standards: A set of statements, 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 analysing each task to determine the steps, circumstantial knowledge, attitudes, performance standards, tools and materials needed, as well as safety concerns required for the employees performing it.

Task: A work activity that has a definite beginning and ending, is observable or measurable, and consists of two or more definite steps that leads to a product, service, or decision.

Underpinning Knowledge: Crucial knowledge that an individual must acquire in order to demonstrate competences that are associated in performing a given task.

Verification Process: The process of having experts review and confirm 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.

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, with a high level of human development. 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 and Vocational Education and Training (NACTVET) has begun the job of drafting Occupational Standards (OS) that will eventually be adopted as National Occupational Standards (NOS) for use in the delivery of TET that meets the needs of the labour market and the country's economic agenda.

Occupational Standards (OS) are performance criteria that are matched with labour market demands. Each of them describes the functions, performance standards, and understanding or knowledge underpinning a given occupation. They combine skills, knowledge, and attitudes to describe best practice. They are useful tools for establishing job roles, personnel recruitment, supervision, and appraisal, as well as TET Standards. They are also helpful for benchmarking and harmonizing job 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 application across all public and private institutions.

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

For the purpose of TET delivery, Tanzania has adopted the Competence Based Education and Training (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) programmes. Therefore, it is quite pertinent for TET institutions to use the relevant occupational standards as a benchmark for formulating their curricula.

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.

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 process of developing these Occupational Standards involved both local and international expertise. The process began with an examination of major documents that guide Tanzanian skills development including the *10-year National Skills Development Strategy (2016-2026).* NACTVET 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 team of experts in consultation with practitioners developed draft occupational standards. The draft document was used to develop an occupational profile for each occupation (DACUM Chart), which is attached as an **Appendix** to every Occupational Standard.

The occupational standards were validated during the stakeholders' forum held on 22nd and 23rd February 2024 at Morogoro. The information from the stakeholders' forum provides insight from the workplace, professional bodies, regulatory bodies and sector ministries regarding trends and changes in the profession, including how well graduates are prepared for working in the occupation.

3.0. THE SCOPE AND OVERVIEW OF THE OCCUPATION STANDARDS FOR MOBILE APPLICATION DEVELOPMENT TECHNICIANS

The standards cover a broad range of duties and tasks that can be performed by a Mobile Application Development Technician. However, the occupational standards are not meant to replace individual

job descriptions. Instead, they are to be used for guidance in defining skill levels and knowledge for the technician in specific settings or positions. The Mobile Application Development Technician may perform tasks in a number of key areas of the Occupational Standards, but not necessarily in all areas. For example, in large operations, other individuals may be employed or designated to perform specific tasks.

The Mobile Application Development Technicians shall complete the mobile APP development, mobile Web development and mobile application testing under the supervision of engineers. Technicians complete the basic works of setting up mobile application development environments, designing and creating mobile application interfaces, writing basic function codes of mobile applications, maintaining program codes and testing mobile application software. Generally, the Mobile Application Development Technician performs the following responsibilities:

a) Program document writing
b) Operating system usage
c) Program code maintenance
d) Computer network configuration

The Occupational Standards have been clustered into NTA qualification levels, i.e. NTA LEVEL 4, 5 and 6.

4.0. VALIDITY PERIOD

Due to the rapid development of technology, the validity period of occupational standards is 3-5 years. The review will proceed in the same manner as the one before it, with new occupational standards being developed based on current trends of the labour market.

5.0. OCCUPATIONAL STANDARDS

5.1 OCCUPATIONAL STANDARDS FOR MOBILE APPLICATION DEVELOPMENT TECHNICIAN - NTA LEVEL 4

OCCUPATION	MOBILE APPLICATION DEVELOPMENT TECHNICIAN	OCCUPATION CODE	
DUTY TITLE	WRITE PROGRAM DOCUMENT	**DUTY NO.**	401
TASK TITLE	WRITE DOCUMENT AS PER PROJECT REQUIREMENTS	**TASK NO.**	4011
PERFORMANCE CRITERIA	The person performing this task must be able to write program requirement documents guided by the proposed project requirement analysis in accordance with technical requirements and service specifications.		
RANGE STATEMENT	The task can be performed in the workshop under the supervision of senior mobile application development technicians or mobile application development engineers. The tools and equipment to be used include: 1. Computers; 2. Commonly-used computer operating systems; 3. Computer office software; 4. Printers; 5. Safety gear.		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Obtain the project implementation plan and the requirement analysis document; 2. Prepare the project purpose, background, term definitions and references; 3. Describe the system role, design idea and function point list of the project; 4. Prepare the security of software performance, data backup and recovery contents; 5. Organize the requirement analysis document review meeting; 6. Typeset and print the requirement analysis document;	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Develop the requirement analysis document outline; 1.2 Edit the requirement analysis document contents; 1.3 Typeset the document as per format requirements. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Basic principles of requirement analysis; 2.2 Requirement document format specifications. **3.0 Theories**

7. Explain and clarify the document contents; 8. Observe health, occupational and environmental safety rules and regulations.	The person performing this task must be able to explain the following: 3.1 Image and text processing methods; 3.2 Document format typesetting; 3.3 Tabular data processing method; 3.4 Requirement analysis overview. **4.0 Essential Skills** 4.1 Communication skills; 4.2 Requirement analysis skills; 4.3 Report writing skills; 4.4 Teamwork skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Project document is written in accordance with requirement analysis and technical standards and service specifications.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety.

OCCUPATION	MOBILE APPLICATION DEVELOPMENT TECHNICIAN	OCCUPATION CODE	
DUTY TITLE	WRITE PROGRAM DOCUMENT	**DUTY NO.**	401
TASK TITLE	WRITE PROGRAM DEVELOPMENT DOCUMENT	**TASK NO.**	4012
PERFORMANCE CRITERIA	The person performing this task must be able to write program development documents based on the programming development process and functions in accordance with technical requirements and service specifications.		
RANGE STATEMENT	The task can be performed in the workspace under the supervision of senior programmers or mobile application development engineers. The tools and equipment to be used include: 1. Computers; 2. Commonly-used computer operating systems; 3. Computer office software; 4. Printers; 5. Safety gear.		

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<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:

1. Obtain the project requirement document;
2. Select the programming mode: technology stack, development tool, etc.;
3. Formulate the development strategy;
4. Develop the configuration table and parameters for software development;
5. Design the software logic flow;
6. Design the database table structure;
7. Divide the function modules and design the inter-module interfaces;
8. Prepare the general design document;
9. Organize the document review meeting;
10. Typeset and print the document;
11. Explain and clarify the document contents;
12. Observe health, occupational and environmental safety rules and regulations.

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Detailed knowledge about:

1.0 Methods

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

1.1 Develop the program development document outline;

1.2 Edit the program development document contents;

1.3 Typeset the document as per format requirements.

2.0 Principles

The person performing this task must be able to explain the following principles:

2.1 Basic specifications for program development;

2.2 Development document format specifications.

3.0 Theories

The person performing this task must be able to explain the following:

3.1 Image and text processing methods;

3.2 Document format typesetting;

3.3 Tabular data processing method;

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	3.4 Development process overview.
	4.0 Essential Skills
	4.1 Communication skills;
	4.2 Requirement analysis skills;
	4.3 Report writing skills;
	4.4 Teamwork skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Program development document is written in accordance with technical requirements, and programming development process.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:**
	1. Occupational health and safety.

OCCUPATION	MOBILE APPLICATION DEVELOPMENT TECHNICIAN	OCCUPATION CODE	
DUTY TITLE	WRITE PROGRAM DOCUMENT	**DUTY NO.**	401
TASK TITLE	PREPARE PROGRAM USER MANUAL	**TASK NO.**	4013
PERFORMANCE CRITERIA	The person performing this task must be able to prepare program user manuals based on the understanding of program functions in accordance with technical requirements and service specifications.		
RANGE STATEMENT	The task can be performed in the workspace under the supervision of senior programmers or mobile application development engineers. The tools and equipment to be used include: 1. Computers; 2. Commonly-used computer operating systems; 3. Computer office software; 4. Printers; 5. Safety gear.		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Obtain the project features and user attributes; 2. Prepare the program development purpose, basic principle and basic function; 3. Complete the software usage process operation; 4. Install the software, take a screenshot and save it; 5. Record specific steps of the operation process; 6. Create a presentation document and PPT of program functions; 7. Typeset and print the program user manual as per requirements; 8. Observe health, occupational and environmental safety rules and regulations.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Develop the program user manual outline; 1.2 Edit the program user manual contents; 1.3 Typeset the manual as per format requirements. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Program function operation specifications; 2.2 User manual format specifications. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Image and text processing methods; 3.2 Document format typesetting; 3.3 Function presentation with PPT; 3.4 Development process overview.

	4.0 Essential Skills 4.1 Communication skills; 4.2 Requirement analysis skills; 4.3 Report writing skills; 4.4 Teamwork skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Program user manuals are prepared in accordance with service specifications and application system functions.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety.

OCCUPATION	MOBILE APPLICATION DEVELOPMENT TECHNICIAN	OCCUPATION CODE	
DUTY TITLE	OPERATE SYSTEM USAGE	**DUTY NO.**	402
TASK TITLE	INSTALL AND CONFIGURE COMPUTER OPERATING SYSTEM	**TASK NO.**	4021
PERFORMANCE CRITERIA	The person performing this task must be able to install and configure computer operating systems in accordance with technical requirements and service specifications.		
RANGE STATEMENT	The task can be performed in the workspace under the supervision of senior programmers or mobile application development engineers. The tools and equipment to be used include: 1. Computers; 2. Computer operating system installation software; 3. Mobile operating systems and devices; 4. Virtual machine environment; 5. Safety gear.		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Identify whether the computer operating system matches with the computer hardware; 2. Carry out basic operations and function in the computer system environment; 3. Install the operating system on the computer; 4. Configure the operating system; 5. Install and uninstall software in the system environment; 6. Observe health, occupational and environmental safety rules and regulations.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Install and configure the operating system; 1.2 Use the operating system functions; 1.3 Install software in the operating system. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Basic principles of operating systems; 2.2 Operation specifications of operating systems. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Operating system overview; 3.2 Operating system function introduction; 3.3 Operating system installation and configuration; 3.4 Operating system infrastructure.

	4.0 Essential Skills
	4.1 Communication skills;
	4.2 Requirement analysis skills;
	4.3 Report writing skills;
	4.4 Teamwork skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Computer operating systems are installed in accordance with technical requirements and operation manuals.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:**
	1. Occupational health and safety.

OCCUPATION	MOBILE APPLICATION DEVELOPMENT TECHNICIAN	OCCUPATION CODE	
DUTY TITLE	OPERATE SYSTEM USAGE	**DUTY NO.**	402
TASK TITLE	CONFIGURE AND USE ANDROID OPERATING SYSTEM	**TASK NO.**	4022
PERFORMANCE CRITERIA	The person performing this task must be able to configure and use the Android operating system in accordance with technical requirements and service specifications.		
RANGE STATEMENT	The task can be performed in the workspace under the supervision of senior programmers or mobile application development engineers. The tools and equipment to be used include: 1. Computers; 2. Operating system installation software; 3. Android operating system and devices; 4. Virtual machine environment; 5. Safety gear.		

EVIDENCE REQUIREMENT

PRACTICAL PERFORMANCE	UNDERPINNING KNOWLEDGE
The person performing this task must be able to do the following: 1. Install and configure the Android operating system on a mobile device; 2. Carry out basic operations and function introduction in the Android system environment; 3. Install and uninstall APP software in the Android system; 4. Identify the Android operating system interface and version; 5. Identify whether the mobile device hardware supports the Android operating system; 6. Observe health, occupational and environmental safety rules and regulations.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Configure and use the Android operating system; 1.2 Give a presentation on the Android operating system functions; 1.3 Install software on an Android device. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Android system working principles; 2.2 Android system operation specifications. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Android system overview; 3.2 Android function introduction; 3.3 Basic Android system operations; 3.4 Android system infrastructure.

	4.0 Essential Skills 4.1 Communication skills; 4.2 Requirement analysis skills; 4.3 Report writing skills; 4.4 Teamwork skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The Android system is installed and configured on mobile devices in accordance with user requirements and services.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety.

OCCUPATION	MOBILE APPLICATION DEVELOPMENT TECHNICIAN	OCCUPATION CODE	
DUTY TITLE	OPERATE SYSTEM USAGE	**DUTY NO.**	402
TASK TITLE	CONFIGURE AND USE IOS OPERATING SYSTEM	**TASK NO.**	4023
PERFORMANCE CRITERIA	The person performing this task must be able to configure and use the iOS operating system in accordance with technical requirements and service specifications.		
RANGE STATEMENT	The task can be performed in the workspace under the supervision of senior programmers or mobile application development engineers. The tools and equipment to be used include: 1. Computers; 2. Operating system installation software; 3. iOS operating system and devices; 4. Virtual machine environment; 5. Safety gear.		

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EVIDENCE REQUIREMENT

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PRACTICAL PERFORMANCE	UNDERPINNING KNOWLEDGE
The person performing this task must be able to do the following: 1. Install and configure the iOS operating system on a mobile device; 2. Carry out basic operations and function introduction in the iOS system environment; 3. Install and uninstall APP software; 4. Identify the iOS operating system interface and version; 5. Identify whether the mobile device hardware supports the iOS operating system; 6. Observe health, occupational and environmental safety rules and regulations.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Configure and use the iOS operating system; 1.2 Give a presentation on the iOS operating system functions; 1.3 Install software on an iOS device. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 iOS system working principles; 2.2 iOS system operation specifications. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 iOS system overview; 3.2 iOS function introduction; 3.3 Basic iOS system operations; 3.4 iOS system infrastructure.

	4.0 Essential Skills
	4.1 Communication skills;
	4.2 Requirement analysis skills;
	4.3 Report writing skills;
	4.4 Teamwork skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The iOS system is installed on mobile devices in accordance with user requirements and operation specifications.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety.

OCCUPATION	MOBILE APPLICATION DEVELOPMENT TECHNICIAN	OCCUPATION CODE	
DUTY TITLE	MAINTAIN PROGRAM CODE	**DUTY NO.**	403
TASK TITLE	SET UP APPLICATION DEVELOPMENT ENVIRONMENT	**TASK NO.**	4031
PERFORMANCE CRITERIA	The person performing this task must be able to set up the application development environment in accordance with technical requirements and service specifications.		
RANGE STATEMENT	The task can be performed in the workspace under the supervision of senior programmers or mobile application development engineers. The tools and equipment to be used include: 1. Computers; 2. Commonly-used computer operating systems; 3. Development tools, such as TurboC and VisualC++; 4. Safety gear.		

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<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:

1. Download and install the development kit;
2. Configure development environment variables to meet program development environment standards;
3. Use integrated development tools to create new projects and project folders;
4. Complete basic configurations in accordance with the program development manual;
5. Use integrated development environment tools to add plug-ins and debug the project;
6. Analyze project contents;
7. Set up and configure the project testing environment synchronously in accordance with program development requirements;
8. Observe health, occupational and environmental safety rules and regulations.

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Detailed knowledge about:

1.0 Methods

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

1.1 Install and configure the development environment;

1.2 Create new projects and complete configurations;

1.3 Add plug-ins, debug and analyze project contents;

1.4 Test the project development environment.

2.0 Principles

The person performing this task must be able to explain the following principles:

2.1 Development tool installation and configuration specifications;

2.2 Program development environment standards.

3.0 Theories

The person performing this task must be able to explain the following:

3.1 Development tool introduction;

3.2 Development environment configuration;

3.3 Testing environment configuration;

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	3.4 Fundamentals of software testing.
	4.0 Essential Skills
	4.1 Communication skills;
	4.2 Requirement analysis skills;
	4.3 Report writing skills;
	4.4 Teamwork skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	The program development environment is properly set up on a computer.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:**
	1. Occupational health and safety.

OCCUPATION	MOBILE APPLICATION DEVELOPMENT TECHNICIAN	OCCUPATION CODE	
DUTY TITLE	MAINTAIN PROGRAM CODE	**DUTY NO.**	403
TASK TITLE	MAINTAIN APPLICATION LOGICAL CODE	**TASK NO.**	4032
PERFORMANCE CRITERIA	The person performing this task must be able to carry out simple maintenance of logical codes of applications in accordance with technical requirements and service specifications.		
RANGE STATEMENT	The task can be performed in the workspace under the supervision of senior programmers or mobile application development engineers. The tools and equipment to be used include: 1. Computers; 2. Commonly-used computer operating systems; 3. Development tools, such as TurboC and VisualC++; 4. Safety gear.		

EVIDENCE REQUIREMENT

PRACTICAL PERFORMANCE	UNDERPINNING KNOWLEDGE
The person performing this task must be able to do the following: 1. Implement simple program logic using basic data types, arithmetic operators, relational operators and conditional operators; 2. Use the sequence, selection and circulation flow methods to control statements to implement the program's service logic; 3. Store and preprocess program-related data in accordance with program development requirements; 4. Annotate the functions and name the documents of the source program in accordance with program development process specifications; 5. Carry out simple maintenance of logical codes according to the problems feedback from the program operation results; 6. Observe health, occupational and environmental safety rules and regulations.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Process the program code logic; 1.2 Design the service logic flow; 1.3 Store and preprocess data. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Program development process control; 2.2 Program development specifications and principles; 2.3 Programming specifications. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Data types and operators; 3.2 Process control statements; 3.3 Data storage and preprocessing; 3.4 Fundamentals of programming;

	3.5 Fundamentals of structured programs; 3.6 Software function maintenance. **4.0 Essential Skills** 4.1 Communication skills; 4.2 Requirement analysis skills; 4.3 Report writing skills; 4.4 Teamwork skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Programming source code documents are maintained in accordance with user requirements and operation specifications.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety.

OCCUPATION	MOBILE APPLICATION DEVELOPMENT TECHNICIAN	OCCUPATION CODE	
DUTY TITLE	MAINTAIN PROGRAM CODE	**DUTY NO.**	403
TASK TITLE	DEBUG AND PROCESS PROGRAM	**TASK NO.**	4033
PERFORMANCE CRITERIA	The person performing this task must be able to debug and process applications in accordance with technical requirements and service specifications.		
RANGE STATEMENT	The task can be performed in the workspace under the supervision of senior programmers or mobile application development engineers. The tools and equipment to be used include: 1. Computers; 2. Commonly-used computer operating systems; 3. Development tools such as TurboC and VisualC++; 4. Safety gear.		

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

PRACTICAL PERFORMANCE	UNDERPINNING KNOWLEDGE
The person performing this task must be able to do the following: 1. Use integrated development tool software to debug program run-time errors; 2. Write test applications; 3. Debug log documents; 4. Identify, reproduce and simply handle the problems occurring in the program operation; 5. Write tests as required; 6. Deliver reports; 7. Observe health, occupational and environmental safety rules and regulations.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Use IDE tools to debug errors; 1.2 Write test applications and debug log documents; 1.3 Identify and handle problems in time; 1.4 Communicate and coordinate with project team members. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Program debugging principles; 2.2 Testing and delivery principles. **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Program debugging and processing processes; 3.2 Test log document running; 3.3 Fundamentals of programming; 3.4 Fundamentals of software testing.

	4.0 Essential Skills
	4.1 Communication skills;
	4.2 Requirement analysis skills;
	4.3 Report writing skills;
	4.4 Teamwork skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Programs are debugged, with program debugging processing reports delivered, in accordance with user requirements and operation specifications.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety.

OCCUPATION	MOBILE APPLICATION DEVELOPMENT TECHNICIAN	OCCUPATION CODE	
DUTY TITLE	CONFIGURE NETWORK COMMUNICATION	DUTY NO.	404
TASK TITLE	CONFIGURE NETWORK COMMUNICATION	TASK NO.	4041
PERFORMANCE CRITERIA	The person performing this task must be able to configure network environments in accordance with technical requirements and service specifications.		
RANGE STATEMENT	The task can be performed in the workspace under the supervision of senior programmers or mobile application development engineers. The tools and equipment to be used include: 1. Computers; 2. Commonly-used computer operating systems; 3. Network devices such as network cables, optical fibers, switches and routers; 4. Virtual machine environment; 5. Safety gear.		

EVIDENCE REQUIREMENT

PRACTICAL PERFORMANCE	UNDERPINNING KNOWLEDGE
The person performing this task must be able to do the following: 1. Configure simple network working environments, including switches or wireless routers; 2. Set IP addresses and gateways of clients and servers; 3. Fabricate network cables; 4. Test whether network communications in the runtime environment are normal; 5. Handle communication faults occurring in the network operation; 6. Observe health, occupational and environmental safety rules and regulations.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Configure switches and routers; 1.2 Set IPs and gateways; 1.3 Test network communications; 1.4 Handle network faults. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Network working principles 2.2 Network configuration and testing principles **3.0 Theories** The person performing this task must be able to explain the following: 3.1 Introduction to network systems; 3.2 Fundamentals of network interconnection;

	3.3 Introduction to network devices; 3.4 Fundamentals of computer networks; 3.5 Secure operations of network devices. **4.0 Essential Skills** 4.1 Communication skills; 4.2 Requirement analysis skills; 4.3 Report writing skills; 4.4 Teamwork skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Network communications are configured, with program debugging processing reports delivered, in accordance with user requirements and operation specifications.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:** 1. Occupational health and safety.

OCCUPATION	MOBILE APPLICATION DEVELOPMENT TECHNICIAN	OCCUPATION CODE	
DUTY TITLE	CONFIGURE NETWORK COMMUNICATION	**DUTY NO.**	404
TASK TITLE	DEVELOP NETWORK COMMUNICATION	**TASK NO.**	4042
PERFORMANCE CRITERIA	The person performing this task must be able to carry out simple network communication development in accordance with technical requirements and service specifications.		
RANGE STATEMENT	The task can be performed in the workspace under the supervision of senior programmers or mobile application development engineers. The tools and equipment to be used include: 1. Computers; 2. Commonly-used computer operating systems; 3. Network devices such as network cables, optical fibers, switches and routers; 4. Virtual machine environment; 5. Safety gear.		

EVIDENCE REQUIREMENT	
PRACTICAL PERFORMANCE	**UNDERPINNING KNOWLEDGE**
The person performing this task must be able to do the following: 1. Use the message delivery mechanism to implement the thread communication between application components; 2. Use data analysis components to complete data parsing and calling; 3. Use Android network request tools to complete network communication requests; 4. Implement the network communication between the mobile client and the server in accordance with HTTP principles; 5. Observe health, occupational and environmental safety rules and regulations.	**Detailed knowledge about:** **1.0 Methods** The person performing this task must be able to explain how to: 1.1 Implement the thread communication between application components; 1.2 Parse and call the received data; 1.3 Complete network communication requests; 1.4 Implement the network communication between the client and the server. **2.0 Principles** The person performing this task must be able to explain the following principles: 2.1 Network communication principles; 2.2 Network communication development principles; 2.3 HTTP principles. **3.0 Theories** The person performing this task must be able to explain the following:

	3.1 Thread communications;
	3.2 Data parsing;
	3.3 Communication requests;
	3.4 Communication protocols;
	3.5 Fundamentals of network interconnection.
	4.0 Essential Skills
	4.1 Communication skills;
	4.2 Requirement analysis skills;
	4.3 Report writing skills;
	4.4 Teamwork skills.
DESCRIPTION OF THE END PRODUCT / SERVICE	Network communications are developed, with program debugging processing reports delivered, in accordance with technical requirements and operation specifications.
CIRCUMSTANTIAL KNOWLEDGE	**Detailed knowledge about:**
	1. Occupational health and safety.

APPENDIX: DACUM CHARTS FOR MOBILE APPLICATION DEVELOPMENT TECHNICIAN - NTA LEVEL 4

DUTIES	TASKS	ENABLERS
1.0 Write Program document	1.1 Write document as per project requirements . 1.2 Write program development document. 1.3 Prepare program user manual.	**General skills and knowledge** · Cooperating with others using communication skills and reporting to the superiors · Office software operation · Document editing and typesetting · Text and image processing · Data report processing · Function presentation with PPT · Document management competence · Auxiliary handling of problems · Program development process · Program function introduction **Tools and equipment** · Computers · Commonly-used computer operating systems · Computer office software **Materials** · Papers · Office software materials **Requirements for employees** · Teamwork spirit · Integrity · Time management · Emphasis on commitment
2.0 Operate system usage	2.1 Install and configure computer operating system. 2.2 Configure and use Android operating system	**General skills and knowledge** · Cooperating with others using communication skills and reporting to the superiors · Basic computer system operations

DUTIES	TASKS	ENABLERS
	2.3 Configure and use iOS operating system.	· Computer operating system installation and configuration · Mobile operating system introduction · Android system application fields · Android system configuration and usage · iOS system application fields · iOS system configuration and usage · Simple system problem handling · Assistance in system testing **Tools and equipment** · Computers · Computer operating system installation disks · Mobile virtual device environment **Materials** · Papers · Office software materials **Requirements for employees** · Teamwork spirit · Integrity · Time management · Emphasis on commitment
3.0 Maintain program code	3.1 Set up application development environment. 3.2 Maintain application logical code. 3.3 Debug and process program	**General skills and knowledge** · Cooperating with others using communication skills and reporting to the superiors · Integrated development tool usage · Development environment setup and configuration · Fundamentals of program syntax · Program flow control · Program code specifications · Program debugging and operation · Auxiliary test and delivery · General logical thinking

DUTIES	TASKS	ENABLERS
		Tools and equipment · Computers · Commonly-used computer operating systems · Development tools such as TurboC and VisualC++ **Materials** · Office software materials **Requirements for employees** · Teamwork spirit · Integrity · Time management · Emphasis on commitment
4.0 Configure network communication	4.1 Configure network communication. 4.2 Develop network communication.	**General skills and knowledge** · Cooperating with others using communication skills and reporting to the superiors · Introduction to computer networks · Models and terms of network fundamentals · TCP/IP reference models and functions of each layer · Commonly-used networking protocols and their principles · Fundamentals of network interconnection · Network communication testing · Network fault handling · Network communication requests · Data parsing and calling **Tools and equipment** · Computers · Network cable testers, cable clamps, switches, routers and so on · Commonly-used computer operating systems

DUTIES	TASKS	ENABLERS
		Materials
		· Virtual machine environment
		· Network cables and optical fibers
		Requirements for employees
		· Teamwork spirit
		· Integrity
		· Time management
		· Emphasis on commitment