NATIONAL SKILLS QUALIFICATION

MOBILE APPLICATION DEVELOPMENT

NATIONAL SKILLS QUALIFICATION

LEVEL 2- MOBILE APPLICATION DEVELOPMENT

GENERAL INFORMATION

QUALIFICATION PURPOSE

This qualification is aimed at developing competence in mobile applications development across different platforms. The focus is on generic mobile programming language training, communication skills, personal development and workplace experience.

QUALIFICATION OBJECTIVES

To achieve this qualification, the Mobile Application Developer should gain the following competencies:

- Understand and apply safe working practices in their work environment
- Identify safety signs and symbols and how to use them correctly.
- Understand the benefits of effective communication in a working environment.
- Identify, read and follow documented instructions.
- Understand the concepts behind softwares and its development life cycle.
- Understand Mobile Application concepts.
- Identify various mobile development platforms.
- Setup mobile projects on IDE.
- Add layouts and layout elements using GUI.
- Preview App on emulator and physical device.
- Diagnose app performance issues.

Mandatory Units

S/No /Unit No	Reference Number	NOS Title	Credit Value	Guided Learning Hours	Remark
1	ICT/MAD/2/001	Occupational Health and Safety	2	20	Level 2
2	ICT/MAD/2/002	Communication and Interpersonal Skills	2	20	Level 2
3	ICT/MAD/2/003	Fundamentals of Mobile Application	5	50	Level 2

		Development			
4	ICT/MAD/2/004	Working with Mobile App Development Platforms	6	40	Level 2
TOTAL			**15**	**150**	

GUIDE

Unit title	Provides a clear explanation of the content of the unit.
Unit number	The unique number assigned to the unit.
Unit reference	The unique reference number given to each unit at qualification approval by NBTE
Unit level	Denotes the level of the unit within the National Vocational Qualification framework NVQF.
Unit credit value	The value that has been given to the unit based on the expected learning time for an average learner. 1 credit = 10 learning hours
Unit aim	Provides a brief outline of the unit content.
Learning outcome	A statement of what a learner will know, understand or be able to do, as a result of a process of learning.
Assessment criteria	A description of the requirements a learner must achieve to demonstrate that a learning outcome has been met.
Unit assessment guidance	Any additional guidance provided to support the assessment of the unit.
Unit guided learning hours	The average number of hours of supervised or directed study

	time or assessment required to achieve a qualification or unit of a qualification.

National Skill Qualification

LEVEL 2 - MOBILE APPLICATION DEVELOPMENT

Unit 1: OCCUPATIONAL HEALTH AND SAFETY

Unit Reference Number: ICT/MAD/2/001

Level: 2

Credit Value: 2

Guided Learning Hours: 20

Unit Purpose: This unit specifies the competencies required to demonstrate understanding of safe work practices. It involves learning about workplace safety, correct use of signs and symbols, identifying and reducing risks of hazards in the work environment.

Unit assessment requirements/ evidence requirement

Assessment must be carried out in real workplace environment in which learning and human development is carried out.

Assessment methods to be used include:

1. Direct Observation/oral questions (DO).
2. Question and Answer (QA).
3. Professional Discussion (PD).
4. Reflective Journal (RJ).

UNIT 01: OCCUPATIONAL HEALTH AND SAFETY

LEARNING OBJECTIVE (LO) The learner will:		PERFORMANCE CRITERIA The learner can:	Evidence Type					Evidence Ref. Page No.			
LO 1: Demonstrate Safe working Practices and Instructions	1.1	Explain safe work practice and instructions.									
	1.2	Identify safety signs and symbols.									
	1.3	Use signs and symbols correctly.									
	1.4	Carry out safe work practices and instructions.									
	1.5	Work in accordance with health and safety best practices.									
LO 2: Demonstrate Understanding of Safety Hazards and risks	2.1	Identify work environment hazards.									
	2.2	List various ways to avoid common workplace hazards									
	2.3	State methods to reduce the risk of work hazards.									
LO 3: Possess the ability to take appropriate actions during accident/injuries	3.1	Identify basic first aid equipment.									
	3.2	identify the benefits of first aid equipments									
	3.3	State how to maintain hygienic, safe and secure workplace.									
	3.4	State the uses of safety equipment in a mobile application work environment.									
LO 4: Demonstrate safe work habit and clean work environment	4.1	Use safe access and exit routes in the work environment.									
	4.2	Have knowledge of safe work habit and clean work environment.									
	4.3	Dispose all wastes appropriately to designated waste facilities									

Registration Data

Subfield:	
Date first registered:	
Date this version registered:	
Anticipated review:	
Body responsible for review:	National Board for Technical Education

UNIT 2: COMMUNICATION AND INTERPERSONAL SKILLS

Unit Reference Number: ICT/MAD/2/002

Level: 2

Credit Value: 2

Guided Learning Hours: 20

Unit Purpose: This unit specifies the competencies required to demonstrate good communication and interpersonal skills. It Involves the ability to read and understand documented instructions and the ability to know how to communicate respectfully when in a bad mood or under pressure.

Unit assessment requirements/ evidence requirements:

Assessment must be carried out in real workplace environment in which learning and human development is carried out.

Assessment methods to be used include:

1. Direct Observation/oral questions (DO).
2. Question and Answer (QA).
3. Professional Discussion (PD).
4. Reflective Journal (RJ).

UNIT 02: COMMUNICATION AND INTERPERSONAL SKILL

LEARNING OBJECTIVE (LO) The learner will:		PERFORMANCE CRITERIA The learner can:	Evidence Type					Evidence Ref. Page No.			
LO 1: Demonstrate knowledge of the importance of good communication	1.1	State reasons why good communication is important.									
	1.2	List ways to communicate effectively.									
	1.3	Exhibit patience and a mild demeanour while communicating with colleagues, managers and clients.									
	1.4	Speak in a professional manner.									
	1.5	Use respectful body language even when in a bad mood or while under pressure.									
LO 2: Demonstrate ability to follow documented instructions	2.1	Read and accurately follow steps in a mobile framework/plugin installation documentation.									
	2.2	Interpret and understand mobile app documentation.									
	2.3	While programming, find specific class definitions and method descriptions in documentations.									
LO 3: Demonstrate ability to create documented instructions	3.1	Determine what is needed in a documented instruction									
	3.2	Describe how the scope of the documented instruction is valid									
	3.3	Explain the importance of the documented instruction.									

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Unit 3: FUNDAMENTALS OF MOBILE APPLICATION DEVELOPMENT

Unit Reference Number: ICT/MAD/2/003

Level: 2

Credit Value: 5

Guided Learning Hours: 50

Unit Purpose:

This unit specifies the competencies required to demonstrate understanding of the fundamentals of mobile applications development. It involves learning about the basics of operating systems, types and features of mobile operating systems.

Prerequisite(s)

Basic Computer Appreciation.

Unit assessment requirements/ evidence requirements:

Assessment must be carried out in real workplace environment in which learning and human development is carried out.

Assessment methods to be used include:

1. Direct Observation/oral questions (DO).
2. Question and Answer (QA).
3. Reflective Journal (RJ).

UNIT 03: FUNDAMENTALS OF MOBILE APPLICATION DEVELOPMENT

LEARNING OBJECTIVE (LO) The learner will:		PERFORMANCE CRITERIA The learner can:	Evidence Type					Evidence Ref. Page No.			
LO 1: Demonstrate Understanding of Basic Software Concepts	1.1	Explain the history of software.									
	1.2	Identify and differentiate between types of desktop operating systems.									
	1.3	Explain the difference between functional and object-oriented programming languages.									
	1.4	Explain stages of software development life-cycle.									
LO 2: Demonstrate Understanding of Basic Mobile Applications Concepts	2.1	Explain the history of mobile applications.									
	2.2	Identify and differentiate between types of mobile operating systems.									
	2.3	Differentiate between Native, Hybrid and Web mobile applications.									
LO 3: Demonstrate Basic mobile application testing	3.1	Explain how mobile apps are tested within the IDE using emulators.									
	3.2	Identify various tools used for testing applications across the most popular mobile operating system.									
	3.3	Demonstrate how mobile application can be subjected to field testing.									

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Unit 4: WORKING WITH MOBILE APP DEVELOPMENT PLATFORMS

Unit Reference Number: ICT/MAD/2/004

Level: 2

Credit Value: 6

Guided Learning Hours: 60

Unit Purpose:

This unit specifies the competencies required to demonstrate knowledge of native and hybrid mobile application development platforms. It Involves use of integrated development environment (IDE) and the ability to start new projects, write simple mobile applications and preview results on an emulator as well as on a physical device.

Prerequisite(s):

Unit 3

Unit assessment requirements/ evidence requirements:

Assessment must be carried out in real workplace environment in which learning and human development is carried out.

Assessment methods to be used include:

1. Direct Observation/oral questions (DO).
2. Question and Answer (QA).
3. Work Products (WP).

UNIT 4: Working with Mobile App Development Platforms

LEARNING OBJECTIVE (LO) The learner will:		PERFORMANCE CRITERIA The learner can:	Evidence Type					Evidence Ref. Page No.			
LO 1: Demonstrate ability to setup mobile applications development environment	1.1	Identify various programming languages used in mobile applications development.									
	1.2	State popular mobile applications development platforms.									
	1.3	Differentiate between native and hybrid platforms.									
	1.4	Setup a native mobile development platform of choice.									
	1.5	List the steps involved in writing, building an app for execution on an emulator.									
	1.6	List the steps involved in writing, building, packaging and transferring the app offline (e.g. via USB cable) for execution on a physical device.									
	1.7	Write a simple “Hello World” application on the platform. Successfully execute this app on an emulator as well as on a physical device.									
LO 2: Demonstrate understanding of programming language of choice.	2.1	Understand basic concepts of the language.									
	2.2	identify syntax peculiar to the programming language									
	2.3	Understand the static or dynamic technology involved with the chosen library									
	2.4	Understand the classes and method									

		technicalities involved in the language of choice.									
LEARNING OBJECTIVE (LO) **The learner will:**		**PERFORMANCE CRITERIA** **The learner can:**	**Evidence Type**					**Evidence Ref. Page No.**			
LO 3: Demonstrate understanding of project setup, configuration and use of user interface elements.	3.1	Setup and configure a new project									
	3.2	Add files and resources to the project									
	3.3	Add layouts, buttons, containers, and images into the project view files using IDE user interface design tools									

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NATIONAL SKILLS QUALIFICATION

LEVEL 3- MOBILE APPLICATION DEVELOPMENT

GENERAL INFORMATION

QUALIFICATION PURPOSE

This qualification is aimed at developing competence in mobile applications development across different platforms. The focus is on generic mobile programming language training, communication skills, personal development and workplace experience.

QUALIFICATION OBJECTIVES

To achieve this qualification, the Mobile Application Developer should gain the following competencies:

- Understanding types of programing languages in relation to mobile development.
- Implement basic programming operations and functions.
- Relate the programming language to the mobile application.
- Develop mockups and prototypes.
- Implement prototype on multiple screen sizes.
- Demonstrate use of event listeners and triggers in a mobile app.
- Identify various map services that can be used in a mobile app.
- Implement use of map API in geolocation and reverse geolocation.
- Demonstrate the use of SMS and Email in the mobile app.
- Understand basic network and connectivity tools.
- Implement network calls that consume APIs.
- Understand use of broadcast and notifications.
- Implement security mechanisms in mobile application.

Mandatory Units

S/No /Unit No	Reference Number	NOS Title	Credit Value	Guided Learning Hours	Remark
1	ICT/MAD/3/001	Working with a programming language of choice.	7	70	Level 3
2	ICT/MAD/3/002	User Interaction Design	6	60	Level 3
3	ICT/MAD/3/003	Using Maps and Location Services	4	40	Level 3
4	ICT/MAD/3/004	Network Services	4	40	Level 3
5	ICT/MAD/3/005	Notifications & broadcast services	4	40	Level 3
6	ICT/MAD/3/006	Messaging services	4	40	Level 3
7.	ICT/MAD/3/007	Security in Mobile Applications	3	30	Level 3
TOTAL			**32**	**320**	

GUIDE

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	1 credit = 10 learning hours
Unit aim	Provides a brief outline of the unit content.
Learning outcome	A statement of what a learner will know, understand or be able to do, as a result of a process of learning.
Assessment criteria	A description of the requirements a learner must achieve to demonstrate that a learning outcome has been met.
Unit assessment guidance	Any additional guidance provided to support the assessment of the unit.
Unit guided learning hours	The average number of hours of supervised or directed study time or assessment required to achieve a qualification or unit of a qualification.

Unit 1: WORKING WITH A PROGRAMMING LANGUAGE OF CHOICE

Unit Reference Number: ICT/MAD/3/001

Level: 3

Credit Value: 7

Guided Learning Hours: 70

Unit Purpose:

This unit specifies the competencies required to demonstrate knowledge of programming language(s) of choice to be used in mobile application development. It involves the use of integrated development environment (IDE) peculiar to the language.

Prerequisite(s):

Level 2

Unit assessment requirements/ evidence requirements:

Assessment must be carried out in real workplace environment in which learning and human development is carried out.

Assessment methods to be used include:

1. Direct Observation/oral questions (DO).
2. Question and Answer (QA).
3. Work Products (WP).

UNIT 1: WORKING WITH A PROGRAMMING LANGUAGE OF CHOICE

LEARNING OBJECTIVE (LO) The learner will:		PERFORMANCE CRITERIA The learner can:	Evidence Type					Evidence Ref. Page No.			
LO 1 Demonstrate knowledge of language of choice.	1.1	Explain the basics of the language.									
	1.2	State the importance of the language.									
	1.3	Explain language syntax and structure (data types, data structures and functions).									
	1.4	Define variables									
	1.5	Define functions/methods									
LO 2 Demonstrate implementation of the language in relation to the platform.	2.1	Explain the various logic involved in the language.									
	2.2	Write methods to perform tasks.									
	2.3	Explain how the programming language is to be used in the mobile platform development.									
LO 3 Demonstrate ability to test and debug with the language of choice	3.1	Explain where the test should be located									
	3.2	Describe the expected and desired output for a normal case with correct input.									
	3.3	Describe the process of the test by using a class.									

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UNIT 2: USER INTERACTION DESIGN

Unit Reference Number: ICT/MAD/3/002

Level: 3

Credit Value: 6

Guided Learning Hours: 60

Unit Purpose:

This unit specifies the competencies required to demonstrate understanding of graphical user interface (GUI) mockup design, tablet and smartphone user interface design, working with event listeners and triggers, and understanding GUI backward compatibility techniques.

Prerequisite(s)

Level 2

Unit assessment requirements/evidence requirements:

Assessment must be carried out in real workplace environment in which learning and human development is carried out.

Assessment methods to be used include:

1. Direct Observation/oral questions (DO).
2. Question and Answer (QA).
3. Work Products (WP).
4. Reflective Journal (RJ).

UNIT 02: USER INTERACTION DESIGN

LEARNING OBJECTIVE (LO) The learner will:		PERFORMANCE CRITERIA The learner can:	Evidence Type					Evidence Ref. Page No.				
LO 1: Demonstrate knowledge of creating an application for multiple screen sizes	1.1	Explain the differences between smartphone and tablet design processes.										
	1.2	Identify different user interface components used in mobile design platforms.										
	1.3	Execute the design of a tablet compatible application on a popular mobile platform.										
LO 2: Demonstrate knowledge of graphics design	2.1	State attributes of popular graphics design tools										
	2.2	State advantages of one over the other										
	2.3	Construct mock-ups using graphics design tool										
LO 3: Demonstrate the ability to work effectively with GUI events	3.1	State common graphical user interface (GUI) event types										
	3.2	Explain the roles of the various event listeners and triggers										
	3.3	Implement event listeners and event triggers in a mobile application.										
LO 4: Demonstrate ability to ensure backward compatibility of mobile app user interface	4.1	Identify user interface components that may require backward compatibility across several platforms										
	4.2	Execute a version compatible user interface in a mobile app										
	4.3	Compare the user interface across two versions of the related mobile operating system										

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UNIT 3: USING MAP AND LOCATION SERVICES

Unit Reference Number: ICT/MAD/3/003

Level: 3

Credit Value: 4

Guided Learning Hours: 40

Unit Purpose:

This unit specifies the competencies required to deliver mobile apps that utilize maps and location based services. It involves knowledge of available map service providers. It also comprises competency in adding a map to a project, customizing maps, and executing Geolocation and Reverse Geolocation.

Prerequisite(s)

Level 2

Unit assessment requirements/ evidence requirements:

Assessment must be carried out in real workplace environment in which learning and human development is carried out.

Assessment methods to be used include:

1. Direct Observation/oral questions (DO).
2. Question and Answer (QA).
3. Work Products (WP).
4. Reflective Journal (RJ)

UNIT 03: USING MAP AND LOCATION SERVICES

LEARNING OBJECTIVE (LO) The learner will:		PERFORMANCE CRITERIA The learner can:	Evidence Type					Evidence Ref. Page No.			
LO 1: Demonstrate knowledge of existing map services	1.1	State different types of map services.									
	1.2	Identify distinguishing features of the different map services.									
	1.3	Differentiate between the usage policies and pricing of these map services.									
LO 2: Demonstrate the use of map service Application Programming Interfaces (APIs).	2.1	List the steps to be taken to execute the development of a mobile app that uses a map service.									
	2.2	Obtain map API keys from the map service provider.									
	2.3	Write and execute a mobile app code that displays a map.									
	2.4	Programmatically control the zoom and change the views.									
	2.5	Add markers at specific locations on the map.									
	2.6	Get coordinates and other available info about a location that was touched.									
	2.7	Write a map project to demonstrate Geocoding and Reverse Geocoding.									
	2.8	Use the map to monitor device Geolocation.									
	2.9	Use the map to monitor device Geolocation.									

LEARNING OBJECTIVE (LO) The learner will:		PERFORMANCE CRITERIA The learner can:	Evidence Type					Evidence Ref. Page No.			
LO 3: Demonstrate knowledge of a location-aware app	3.1	Explain the concept of location awareness.									
	3.2	Understand the location API and its availability.									
	3.3	Describe the process involved in maps and location in various mobile platforms.									

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UNIT 4: NETWORK SERVICES

Unit Reference Number: ICT/MAD/3/004

Level: 3

Credit Value: 4

Guided Learning Hours: 40

Unit Purpose: This unit specifies the competencies required to demonstrate knowledge of using HTTP requests. This includes making network calls to RESTful APIs, GraphQL APIs.

Prerequisite(s)

Level 2

Unit assessment requirements/ evidence requirements:

Assessment must be carried out in real workplace environment in which learning and human development is carried out.

Assessment methods to be used include:

1. Direct Observation/oral questions (DO).
2. Question and Answer (QA).
3. Witness Testimony (WT).
4. Assignment (ASS).
5. Work Products (WP).

UNIT 4: NETWORK SERVICES

LEARNING OBJECTIVE (LO) The learner will:		PERFORMANCE CRITERIA The learner can:	Evidence Type					Evidence Ref.		Page No.	
LO 1: Understand networking in mobile applications.	1.1	Explain networking in relation to mobile applications.									
	1.2	Explain the concept of HTTP requests.									
	1.3	State the advantages of HTTP requests									
	1.4	Differentiate between synchronous and asynchronous HTTP requests.									
LO 2: Understand Web services in mobile applications	2.1	Explain web services and its relation to mobile applications.									
	2.2	List popular web services.									
	2.3	Write a web service.									
LO 3: Demonstrate network calls in mobile applications	3.1	Explain network permissions in mobile applications.									
	3.2	Write mobile applications to call web services.									
	3.3	Handle responses from web services									

Registration Data

Subfield:	
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UNIT 5: NOTIFICATION AND SERVICES

Unit Reference Number: ICT/MAD/3/008

Level: 3

Credit Value: 4

Guided Learning Hours: 40

Unit Purpose: This unit specifies the competencies required to demonstrate knowledge of notifications and broadcast services. It involves learning about push notifications and communication with other applications within the device.

Prerequisite(s)

Level 2

Unit assessment requirements/ evidence requirements:

Assessment must be carried out in real workplace environment in which learning and human development is carried out.

Assessment methods to be used include:

1. Direct Observation/oral questions (DO).
2. Question and Answer (QA).
3. Witness Testimony (WT).
4. Assignment (ASS).
5. Work Products (WP).

UNIT 5: NOTIFICATION AND SERVICES

LEARNING OBJECTIVE (LO) The learner will:		PERFORMANCE CRITERIA The learner can:	Evidence Type					Evidence Ref. Page No.			
LO 1: Understand notifications in mobile applications	1.1	Explain notifications in mobile application.									
	1.2	Explain importance of notifications.									
	1.3	List examples of notifications.									
LO 2: Understand services in mobile application.	2.1	Explain services in mobile application.									
	2.2	List type of services in mobile application.									
	2.3	Build services in mobile development.									
LO 3: Demonstrate notifications in mobile applications.	3.1	List steps to build a notification.									
	3.2	Explain how to publish notification.									
	3.3	Perform other tasks through a notification.									

Registration Data

Subfield:	
Date first registered:	
Date this version registered:	
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Body responsible for review:	National Board for Technical Education

UNIT 6: MESSAGING SERVICES

Unit Reference Number: ICT/MAD/3/006

Level: 3

Credit Value: 4

Guided Learning Hours: 40

Unit Purpose: This unit specifies the competencies required to demonstrate knowledge of messaging services in relation to mobile applications. It involves learning about sending and receiving messages and e-mails within the mobile application.

Prerequisite(s)
Level 2

Unit assessment requirements/ evidence requirements:

Assessment must be carried out in real workplace environment in which learning and human development is carried out.

Assessment methods to be used include:

1. Direct Observation/oral questions (DO).
2. Question and Answer (QA).
3. Witness Testimony (WT).
4. Assignment (ASS).
5. Work Products (WP).

UNIT 6: MESSAGING SERVICES

LEARNING OBJECTIVE (LO) The learner will:		PERFORMANCE CRITERIA The learner can:	Evidence Type					Evidence Ref. Page No.			
LO 1: Demonstrate ability to use SMS programmatically.	1.1	State some benefits of SMS									
	1.2	Write a mobile app that demonstrates ability to send SMS programmatically									
	1.3	Write a mobile app that demonstrates ability to send SMS by launching the device default messaging application.									
	1.4	Write a mobile app that demonstrates ability to receive and process SMS programmatically.									
LO 2: Demonstrate the knowledge of building communication App	2.1	Understand the benefits of communication API within a mobile app									
	2.2	Identify various popular messaging API									
	2.3	Identify various messaging API both for mobile and other platform									
	2.4	Describe process in creating an in-app message									
LO 3: Demonstrate an overview of messaging support	3.1	Identify various messaging support document									
	3.2	Explain the various message support like sending pictures, videos and links									
	3.3	Explain the concept of multimedia messaging support.									

Registration Data

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Date first registered:	
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Body responsible for review:	National Board for Technical Education

UNIT 7: SECURITY IN MOBILE APPLICATION

Unit Reference Number: ICT/MAD/3/007

Level: 3

Credit Value: 3

Guided Learning Hours: 30

Unit Purpose: This unit specifies the competencies required to demonstrate understanding securing mobile applications. It comprises competency in securing applications through authentication and authorization thereby restricting access and controlling usage.

Prerequisite(s)

Level 3

Unit assessment requirements/evidence requirements:

Assessment must be carried out in real workplace environment in which learning and human development is carried out.

Assessment methods to be used include:

1. Direct Observation/oral questions (DO).
2. Question and Answer (QA).
3. Witness Testimony (WT).

UNIT 7: SECURITY IN MOBILE APPLICATION

LEARNING OBJECTIVE (LO) The learner will:		PERFORMANCE CRITERIA The learner can:	Evidence Type					Evidence Ref. Page No.			
LO 1: Demonstrate understanding Security mechanisms of mobile application	1.1	Explain the concept of security in mobile app development									
	1.2	Enumerate the different strategies in securing a mobile app									
	1.3	Explain the different concepts and strategies for securing mobile a mobile application									
LO 2: Demonstrate understanding of the implementation of user authentication in mobile application	2.1	Define user authentication in the context of mobile application.									
	2.2	Explain the processes involved in user authentication									
	2.3	Implement user authentication in a mobile app.									
LO 3: Demonstrate understanding of the implementation of user authorization in mobile apps	3.1	Define user authentication in the context of mobile application.									
	3.2	Differentiate between user authentication and authorization									
	3.3	Explain the processes involved in user authorization									
	3.4	Implement user authorization in a mobile app.									
LO4: Demonstrate ability to consume	4.1	Explain transport layer security.									
	4.2	Explain the processes involved in consuming transport layer security via a mobile application									

transport layer security mechanism in mobile application	4.3	Implement consumption of transport layer security mechanism on a mobile application.										

NATIONAL SKILLS QUALIFICATION

LEVEL 4- MOBILE APPLICATION DEVELOPMENT

GENERAL INFORMATION

QUALIFICATION PURPOSE

This qualification is aimed at developing competence in mobile applications development across different platforms. The focus is on generic mobile programming language training and workplace experience.

QUALIFICATION OBJECTIVES

To achieve this qualification, the Mobile Application Developer should gain the following competencies:

- Write code for mobile application features.
- Carry out various types of mobile testing
- Understand how debugging is performed.
- Understand how to publish mobile apps online.
- DIscuss monetization in relation to mobile application.
- Integrating external libraries.
- Understanding licensing in relation to mobile application.
- Developing documentations for mobile application products.
- Understand different storage techniques.
- Perform mobile databases operations.
- Perform cloud storage operations.

Mandatory Units

S/No /Unit No	Reference Number	NOS Title	Credit Value	Guided Learning Hours	Remark
1	ICT/MAD/4/001	Essentials of Data Handling	5	50	Level 4
2	ICT/MAD/4/002	Developing Background Services	4	40	Level 4
3	ICT/MAD/4/003	Testing and Debugging Mobile Applications	5	50	Level 4
4	ICT/MAD/4/004	Publishing Mobile Apps Online	4	40	Level 4
5	ICT/MAD/4/005	Monetization of mobile applications	4	40	Level 4
6	ICT/MAD/4/006	Licensing and Integration with libraries	5	50	Level 4
7	ICT/MAD/4/007	Architectural patterns in mobile Development	4	40	Level 4
8	ICT/MAD/4/008	Repositories in Mobile Application Development	5	50	Level 4
10.	ICT/MAD/4/010	Project Management in Mobile Applications	4	40	Level 4
TOTAL			**43**	**430**	

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Unit reference	The unique reference number given to each unit at qualification approval by NBTE
Unit level	Denotes the level of the unit within the National Vocational Qualification framework NVQF.
Unit credit value	The value that has been given to the unit based on the expected learning time for an average learner. 1 credit = 10 learning hours
Unit aim	Provides a brief outline of the unit content.
Learning outcome	A statement of what a learner will know, understand or be able to do, as a result of a process of learning.
Assessment criteria	A description of the requirements a learner must achieve to demonstrate that a learning outcome has been met.
Unit assessment guidance	Any additional guidance provided to support the assessment of the unit.
Unit guided learning hours	The average number of hours of supervised or directed study time or assessment required to achieve a qualification or unit of a qualification.

UNIT 1: ESSENTIALS OF DATA HANDLING

Unit Reference Number: ICT/MAD/4/001

Level: 4

Credit Value: 5

Guided Learning Hours: 50

Unit Purpose: This unit specifies the competencies required to ensure that application data is effectively stored and made available for use while application is running. It involves understanding how to use internal and external storage media, SQLite mobile database, and cloud storage services.

Prerequisite(s)

Level 3

Unit assessment requirements/evidence requirements:

Assessment must be carried out in real workplace environment in which learning and human development is carried out.

Assessment methods to be used include:

1. Direct Observation/oral questions (DO).
2. Question and Answer (QA).
3. Work Products (WP).
4. Reflective Journal (RJ)

UNIT 1: ESSENTIALS OF DATA HANDLING

LEARNING OBJECTIVE (LO) The learner will:		PERFORMANCE CRITERIA The learner can:	Evidence Type					Evidence Ref. Page No.			
LO 1: Demonstrate knowledge of persistent and non-persistent storage techniques	1.1	Differentiate between volatile and non-volatile memory									
	1.2	Explain the concept of persistent data									
	1.3	Discuss different data types that can be transferred non-persistently									
	1.4	Explain the advantages of non-persistent data with regards to speed of access.									
	1.5	State the limitations of non-persistent data with regards to maximum data size and volatility.									
LO 2: Demonstrate knowledge of working with internal and external storage media	2.1	Differentiate between internal and external storage									
	2.2	Store data to internal storage									
	2.3	Store data to external storage (SD Card)									
	2.4	Download and store static resources (Files, Images, Audio, Video) in an									

		organized and secure manner										
LEARNING OBJECTIVE (LO) **The learner will:**		**PERFORMANCE CRITERIA** **The learner can:**	**Evidence Type**					**Evidence Ref. Page No.**				
LO 3: Demonstrate understanding of mobile SQLite storage techniques	3.1	Explain Structured Query Language (SQL) for mobile application										
	3.2	Mention popular SQL databases used on mobile devices										
	3.3	State some advantages of SQLite database for more mobile devices										
	3.4	Write a mobile app that can execute Create, Read, Update, Delete (CRUD) operations on SQLite database										
	3.5	Write a mobile app that backs up and restores SQLite table data										
	3.6	Write a mobile app that migrates data to new SQL tables with different structure										
LO 4: Demonstrate ability to use cloud storage services	4.1	Identify different cloud storage services available for mobile platforms										
	4.2	Explain various benefits of cloud storage services.										
	4.3	Write a mobile app that stores data on the cloud using a popular cloud service.										

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UNIT 2: DEVELOPING BACKGROUND SERVICES

Unit Reference Number: ICT/MAD/4/002

Level: 4

Credit Value: 4

Guided Learning Hours: 40

Unit Purpose: This unit specifies the competencies required to demonstrate understanding of background services and its equivalents. It comprises competency in using background services to perform long running, repeated, and asynchronous tasks. This unit also specifies the competencies required to demonstrate ability to use features of multithreading and inter process communication in mobile apps.

Prerequisite(s)

Level 3

Unit assessment requirements/evidence requirements:

Assessment must be carried out in real workplace environment in which learning and human development is carried out.

Assessment methods to be used include:

1. Direct Observation/oral questions (DO).
2. Question and Answer (QA).

3. Witness Testimony (WT).

4. Work Products (WP).

UNIT 2: DEVELOPING BACKGROUND SERVICES

LEARNING OBJECTIVE (LO) The learner will:		PERFORMANCE CRITERIA The learner can:	Evidence Type					Evidence Ref. Page No.			
LO 1: Demonstrate ability to effectively use a background service or its equivalent.	1.1	Identify background service equivalents in popular mobile development platforms.									
	1.2	Explain differences between background service equivalents in popular mobile development platforms.									
	1.3	Execute the development of a background service in a mobile app.									
	1.4	Using a background service, perform long running tasks.									
	1.5	Using a background service, perform repeated tasks.									
	1.6	Using a background service, perform asynchronous tasks.									
LO 2: Demonstrate knowledge of multi-threading	2.1	Differentiate between threads and processes.									
	2.2	Explain the advantages of multi-threading.									
	2.3	Explain the thread life cycle.									
	2.4	Execute the design of a mobile app that uses a thread to carry out a specific									

		task.									
	2.5	Display ability to synchronize threads and use thread priority.									
LO 3: Demonstrate knowledge of inter-process communications	3.1	Explain Inter Process Communication (IPC).									
	3.2	State IPC features of popular mobile development platforms.									
	3.3	Write a mobile app that utilizes IPC.									

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UNIT 3: TESTING AND DEBUGGING MOBILE APPLICATIONS

Unit Reference Number: ICT/MAD/4/003

Level: 4

Credit Value: 5

Guided Learning Hours: 50

Unit Purpose: This unit specifies the competencies required to demonstrate understanding of mobile app testing. It comprises competency in preparing and using feedback forms to gather mobile app experience information from app users. As well as competency in executing functional test, performance test, user interface test, power usage test and target device compatibility test.

Prerequisite(s)

Level 3

Unit assessment requirements/evidence requirements:

Assessment must be carried out in real workplace environment in which learning and human development is carried out.

Assessment methods to be used include:

1. Direct Observation/oral questions (DO).
2. Question and Answer (QA).
3. Witness Testimony (WT).

4. Work Products (WP).

UNIT 3: TESTING AND DEBUGGING MOBILE APPLICATIONS

LEARNING OBJECTIVE (LO) The learner will:		**PERFORMANCE CRITERIA The learner can:**	**Evidence Type**					**Evidence Ref. Page No.**				
LO 1: Demonstrate ability to prepare and use feedback forms	1.1	State some benefits of using a feedback form.										
	1.2	Explain how to structure questions correctly.										
	1.3	Prepare a feedback form for users to access the usability of a mobile app.										
	1.4	Explain how to assess feedback form responses to extract useful information.										
LO 2: Demonstrate ability to carry out mobile application testing.	2.1	Explain software testing.										
	2.2	State the different types of software testing.										
	2.3	Execute unit testing on a mobile app.										
	2.4	Execute functional/usability testing on a mobile app.										
	2.5	Execute performance testing on a mobile app.										
	2.6	Execute user interface testing on a mobile app.										
	2.7	Execute mobile app battery usage impact test.										
LEARNING		**PERFORMANCE CRITERIA**	**Evidence**					**Eviden**				

OBJECTIVE (LO) The learner will:		The learner can:	Type					ce Ref. Page No.			
LO 3: Demonstrate debugging abilities	3.1	Ability to detect root cause of errors.									
	3.2	Use online development forums to find solutions to bugs.									
	3.3	Use IDE's log console to trace errors									

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UNIT 4: PUBLISHING MOBILE APPS ONLINE

Unit Reference Number: ICT/MAD/4/004

Level: 4

Credit Value: 4

Guided Learning Hours: 40

Unit Purpose: This unit specifies the competencies required to demonstrate knowledge of app store policies and the procedure for publishing completed mobile apps.

Prerequisite(s)

Level 3

Unit assessment requirements/evidence requirements:

Assessment must be carried out in real workplace environment in which learning and human development is carried out.

Assessment methods to be used include:

1. Direct Observation/oral questions (DO).
2. Question and Answer (QA).
3. Witness Testimony (WT).
4. Reflective Journal

UNIT 4: PUBLISHING MOBILE APPS ONLINE

LEARNING OBJECTIVE (LO) The learner will:		PERFORMANCE CRITERIA The learner can:	Evidence Type					Evidence Ref. Page No.			
LO 1: Demonstrate ability to bundle app for release on app stores	1.1	State the popular mobile App stores									
	1.2	State the application publishing procedure of popular App Stores (e.g. Google Play Store, Apple Store)									
	1.3	Ability to bundle application for release on a popular App Store									
LO 2: Demonstrate ability to prepare app license and terms of use	2.1	State the benefits of including a license and/or terms of use in an application									
	2.2	Differentiate between popular open source licenses (e.g. MIT, GPL, Apache, BSD)									
	2.3	Draft a license for a mobile app.									
	2.4	Draft a terms of use document for a mobile app.									
LO 3: Demonstrate the ability to display adverts on the application	3.1	Explain the concept of advertising in mobile apps.									
	3.2	Differentiate between popular advertising services for mobile apps.									
	3.3	Integrate a popular advert service on a mobile application.									

UNIT 5: MONETIZATION OF MOBILE APPLICATIONS

Unit Reference Number: ICT/MAD/4/005

Level: 4

Credit Value: 5

Guided Learning Hours: 50

Unit Purpose: This unit specifies the competencies required to demonstrate the requirement and steps involved in monetizing an app. This involves placing target advertisements and in-app billings.

Prerequisite(s)

Level 3

Unit assessment requirements/evidence requirements:

Assessment must be carried out in real workplace environment in which learning and human development is carried out.

Assessment methods to be used include:

1. Direct Observation/oral questions (DO).
2. Question and Answer (QA).
3. Work Products (WP).
4. Reflective Journal.

UNIT 5: MONETIZATION OF MOBILE APPLICATIONS

LEARNING OBJECTIVE (LO) The learner will:		PERFORMANCE CRITERIA The learner can:	Evidence Type					Evidence Ref. Page No.			
LO 1: Demonstrate the concept involved in monetization.	1.1	Explain the concept of monetization.									
	1.2	State the concept of subscribing in relation to monetization.									
	1.3	Explain the concept of In-app billing in relation to monetization.									
	1.4	Explain the concept of merchandising and product cataloguing.									
LO 2: Demonstrate the knowledge of the concept of payment gateway.	2.1	Explain how a payment gateway can be integrated in an app.									
	2.2	Describe various payment solutions like google checkout, paypal and others.									
	2.3	Write a mobile app to demonstrate how a payment gateway might be used.									
LO 3: Demonstrate strategy involved in selling goods	3.1	Explain the concept in selling virtual goods within an app.									
	3.2	Explain the concept of selling physical									

within an app		goods within an app									
	3.3	Demonstrate the risk involved in selling within an app.									
	3.4	Demonstrate the process to retain profit with the sales in selling within an app.									

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UNIT 6: MONETIZATION OF MOBILE APPLICATIONS

Unit Reference Number: ICT/MAD/4/006

Level: 4

Credit Value: 4

Guided Learning Hours: 40

Unit Purpose: This unit specifies the competencies required to demonstrate the requirement and steps involved in monetizing an app. This involves placing target advertisements and in-app billings.

Prerequisite(s)

Level 3

Unit assessment requirements/evidence requirements:

Assessment must be carried out in real workplace environment in which learning and human development is carried out.

Assessment methods to be used include:

1. Direct Observation/oral questions (DO).
2. Question and Answer (QA).
3. Work Products (WP).
4. Reflective Journal.

UNIT 6: LICENSING AND INTEGRATION WITH LIBRARIES

LEARNING OBJECTIVE (LO) The learner will:		PERFORMANCE CRITERIA The learner can:	Evidence Type					Evidence Ref. Page No.			
LO 1: Demonstrate knowledge of the concept of APIs and its significance.	1.1	Explain the concept of APIs.									
	1.2	State the benefits of APIs.									
	1.3	Identify and differentiate between 1st party and 3rd party APIs.									
	1.4	Write a mobile app to demonstrate ability to use both an API (e.g The use o the Twitter API).									
LO 2: Demonstrate knowledge of the concept of Licensing	1.1	Explain the concept of Licensing in mobile apps.									
	1.2	Explain the benefits of licensing									
	1.3	Explain the challenges involved in licensing.									
	1.4	Identify ways to gain traction in the app store									
	1.5	Explain the process involved in licensing or selling a mobile product to another company									
LO 3: Demonstrate the process of integration	1.1	Resources for mobile development with YouTube.									
	1.2	Understanding mobile payment libraries									
	1.3	Demonstrate the process involved in									

with major API.		developing a mobile library application									

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UNIT 7: ARCHITECTURAL PATTERNS IN MOBILE DEVELOPMENT

Unit Reference Number: ICT/MAD/4/007

Level: 4

Credit Value: 4

Guided Learning Hours: 40

Unit Purpose: This unit specifies the competencies required to demonstrate the requirement and steps involved in implementing various architecture patterns in an app. This involves placing structuring your code to conform to the rule of Separation of Concerns(SoC).

Unit assessment requirements/evidence requirements:

Assessment must be carried out in real workplace environment in which learning and human development is carried out.

Prerequisite(s)

Level 3

Assessment methods to be used include:

1. Direct Observation/oral questions (DO).
2. Question and Answer (QA).
3. Work Products (WP).

4. Reflective Journal.

UNIT 7: ARCHITECTURAL PATTERNS IN MOBILE DEVELOPMENT

LEARNING OBJECTIVE (LO) **The learner will:**		**PERFORMANCE CRITERIA** **The learner can:**	**Evidence Type**					**Evidence Ref. Page No.**			
LO 1: Understand architectural patterns	1.1	Explain architectural patterns.									
	1.2	State examples of architectural patterns.									
	1.3	Identify and differentiate between the various architectural patterns.									
LO 2: Understand importance of architectural patterns	1.1	Explain the reason for various architectural patterns									
	1.2	Explain the importance of each architectural pattern									
	1.3	State the problem that architectural patterns solve.									
LO 3: Implement architectural patterns in an app.	1.1	State steps involved in setting up an architecture in an app.									
	1.2	Demonstrate knowledge of implementing an architecture pattern.									
	1.3	Implement a known architectural pattern in a mobile application									

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UNIT 8: REPOSITORIES IN MOBILE APPLICATION DEVELOPMENT

Unit Reference Number: ICT/MAD/4/008

Level: 4

Credit Value: 5

Guided Learning Hours: 50

Unit Purpose: This unit specifies the competencies required to demonstrate the requirement and steps involved in the use of repositories as it relates to mobile application development. This involves identifying, understanding and implementing various version control services.

Prerequisite(s)

Level 3

Unit assessment requirements/evidence requirements:

Assessment must be carried out in real workplace environment in which learning and human development is carried out.

Assessment methods to be used include:

1. Direct Observation/oral questions (DO).
2. Question and Answer (QA).
3. Work Products (WP).

4. Reflective Journal (RF).

5. Assignment (ASS).

UNIT 8: REPOSITORIES IN MOBILE APPLICATION DEVELOPMENT

LEARNING OBJECTIVE (LO) **The learner will:**		**PERFORMANCE CRITERIA** **The learner can:**	**Evidence Type**					**Evidence Ref. Page No.**			
LO 1: Demonstrate knowledge of version control.	1.1	Explain the concept of Repositories.									
	1.2	Understand version control in Mobile Application.									
	1.3	Explain the benefits of repositories and version control.									
	1.4	Identify various remote ways to access Mobile Applications.									
	1.5	Explain various ways to access Mobile Application.									
LO 2: Demonstrate knowledge of repositories in Mobile Application	1.1	Explain the concept of code repository service.									
	1.2	Identify popular repository service.									
	1.3	Implement code repository setup.									
	1.4	Carry out connection to a code repository service.									
	1.5	Show ways of contributing to SDK development using a repository service									

LO 3: Demonstrate knowledge of version control integration.	3.1	Explain how to import into version control in the mobile platform.									
	3.2	Explain the process of viewing a repository log.									
	3.3	Explain how to commit, pull and push code changes to repositories									
	3.4	Implement version control integration within a mobile application platform.									

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UNIT 9: PROJECT MANAGEMENT IN MOBILE APPLICATION

Unit Reference Number: ICT/MAD/4/009

Level: 4

Credit Value: 4

Guided Learning Hours: 40

Unit Purpose: This unit specifies the competencies required to demonstrate understanding of project management with respect to mobile application . It comprises competency in end to end management of mobile application projects ranging from requirement gathering and analysis, to upgrades and maintenance.

Prerequisite(s)

Level 3

Unit assessment requirements/evidence requirements:

Assessment must be carried out in real workplace environment in which learning and human development is carried out.

Assessment methods to be used include:

1. Direct Observation/oral questions (DO).
2. Question and Answer (QA).
3. Witness Testimony (WT).
4. Assignment (ASS).

5. Reflective Journal (RF).

UNIT 9: PROJECT MANAGEMENT IN MOBILE APPLICATION

LEARNING OBJECTIVE (LO) The learner will:		PERFORMANCE CRITERIA The learner can:	Evidence Type					Evidence Ref. Page No.			
LO 1: Demonstrate understanding of project management as related to mobile apps	1.1	Define project management.									
	1.2	State advantages of project management									
	1.3	Explain the phases in project management									
LO 2: Demonstrate understanding of requirement gathering and analysis in mobile application	2.1	Explain the concept of requirement gathering and analysis									
	2.2	Mention the channels of information gathering									
	2.3	Write a project specification document stating project milestones and timeline									
LO 3: Demonstrate understanding of project plan as related to mobile apps	3.1	Explain the concept of project plan									
	3.2	Discuss the importance of a project plan									
	3.3	Explain the concept of activities, critical activities, scheduling and timeline.									
	3.4	Use a known project management tool to implement gantt chart									
	3.5	Write a concise project plan for a simple app showing activities, critical activities and corresponding timeline.									
LO 4	4.1	Explain the concept of project design									

Demonstrate understanding of project Design as related to mobile apps	4.2	List the key members of a design team									
	4.3	Show use of mockups, storyboard or wireframes in a simple app idea.									
LO 5: Demonstrate understanding of Product Development as related to mobile apps	3.1	Explain the concept of prototyping.									
	3.2	Explain modular development in the context of an app having multiple features.									
	3.3	Perform module integration.									
LO 6: Demonstrate understanding of Testing as related to mobile apps	6.1	Explain the importance of testing									
	6.2	Explain the different types of testing and demonstrate when they are required in the development process									
	6.3	Integrate tests as determined by the nature of the application									
LO 7: Demonstrate understanding of project maintenance and upgrade as related to mobile apps	7.1	Explain the concept of maintenance.									
	7.2	Enumerate factors that can necessitate upgrade and maintenance operation .									
	7.3	List maintenance operations that can be carried out on a mobile app									
	7.4	Enumerate upgrade operations that can be carried out on a mobile app.									

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