



**NAMIBIA UNIVERSITY  
OF SCIENCE AND TECHNOLOGY**

**FACULTY OF COMPUTING AND INFORMATICS**

**DEPARTMENT OF INFORMATICS**

<b>QUALIFICATION: BACHELOR OF INFORMATICS HONOURS (WEB INFORMATICS)</b>	
<b>QUALIFICATION CODE: 08BIFH</b>	<b>LEVEL: 8</b>
<b>COURSE CODE: MAI821S</b>	<b>COURSE NAME: MOBILE APPLICATIONS IN INFORMATICS</b>
<b>SESSION: NOVEMBER 2019</b>	<b>PAPER: THEORY</b>
<b>DURATION: 3 HOURS</b>	<b>MARKS: 100</b>

<b>FIRST OPPORTUNITY EXAMINATION QUESTION PAPER</b>	
<b>EXAMINER(S)</b>	<b>MR. GABRIEL NHINDA</b>
<b>MODERATOR:</b>	<b>MR. NABOT NATHANAEL</b>

<b>INSTRUCTIONS</b>
<ol style="list-style-type: none"><li>1. Answer ALL the questions.</li><li>2. Write clearly and neatly.</li><li>3. Number the answers clearly.</li></ol>

**PERMISSIBLE MATERIALS**

1. Pen, pencil and eraser
2. Ruler

**THIS QUESTION MEMORANDUM CONSISTS OF 3 PAGES (Including this front page)**

**Section A: Short Questions****[12 Marks]**

1. Which programming languages are used to develop for Android? [2 Marks]
2. List five (5) mobile operators in the African market. [5 Marks]
3. Mobile devices do not operate in isolation but with an ecosystem. Briefly critique five (5) components of the mobile ecosystem. [5 Marks]

**Section B: Descriptive Questions****[46 Marks]**

1. Building interactive applications is a complex task. Thus it is important to understand how potential human users may interact with the applications. A key approach to achieving this is making use of the information processing model. In detail, discuss the human information processing model and how it affects human interaction with mobile devices. [14 Marks]
2. When building mobile applications, it is important to note the device being used. Elaborate on four (4) limitations of mobile devices that may affect mobile applications design. [12 Marks]
3. List and describe any five (5) data gathering techniques used in the requirements activity. [10 Marks]
4. Suggest one key functional, data, environmental, user and usability requirement for the following: A mobile application for the university's cafeteria that allows users to pay for their food using a credit system. [10 Marks]

**Section C: Structured Questions****[42 Marks]**

1. Apple's iOS platform is one of the most popular mobile platforms. Elaborate on the different layers of the iOS architecture. For each layer indicate two (2) components. [16 Marks]
2. Mobile applications have been used to address many problems in society. Community health workers, work within communities to assist with basic health care. They are especially important in those hard-to-reach areas of rural Namibia or the informal settlements within towns. They tend to navigate through different terrains and require a mobile device for their work. You are hired as a mobile designer and you are required to design a mobile paper prototype application. Consider the fact that community health workers may have different types of mobile devices and visit clients with varying network connectivity. Your prototype should have the following components: basic information per patient, security component, in-app calling, and emergency/critical patient alert.

- a. Apply your knowledge of layout design in Android or any other platform learnt to design and draw at least four (4) screens for the application. [10 Marks]
- b. Explain how you made use of the gestalt principles in your design. [10 Marks]
- c. When working with data, some laws that need to be taken into consideration. Indicate how you would inform the community health workers of data privacy and protection within the mobile application. You may use GDPR as an example. [6 Marks]



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<b>INSTRUCTIONS</b>
<ol style="list-style-type: none"><li>1. Answer ALL the questions.</li><li>2. Write clearly and neatly.</li><li>3. Number the answers clearly.</li></ol>

**PERMISSIBLE MATERIALS**

1. Pen, pencil and eraser
2. Ruler

**THIS QUESTION MEMORANDUM CONSISTS OF 6 PAGES (Including this front page)**

## Section A

[12 Marks]

Question 1. Which programming languages are used to develop for Android? [2 Marks]

**Java and Kotlin**

Question 2. List five (5) mobile operators in the African market. [5 Marks]

*1 mark each*

**Sample answers**

**MTN, MTC, TN Mobile, Unitel, Movitel, Econet, Net One**

Question 3. Mobile devices do not operate in isolation but with an ecosystem. Briefly critique five (5) components of the mobile ecosystem. [5 Marks]

*1 mark for each component identified*

**Sample answer**

**Mobile operators**

**Mobile app stores**

**Network providers**

**Mobile devices**

**Students are expected to critic any component of the mobile ecosystem.**

## Section B

[46 Marks]

Question 1. Building interactive applications is a complex task. Thus it is important to understand how potential human users may interact with the applications. A key approach to achieving this is making use of the information processing model. In detail, discuss the human information processing model and how it affects human interaction with mobile devices. [14 Marks]

*2 marks for each of the stages (1 mark for naming, 1 marks for discussion)\*6 + 2 marks for relevance of model to mobile human interaction.*

**The information processing model provides a basis from which to make predictions about human performance. This from the amount of time a human will take to respond to an action. This can be used to calculate how long a person takes for the actions. Which is especially useful when comparing two mobile interface designs.**

The process model looks at cognition and is conceptualized as a series of processing stages, where perceptual, cognitive, and motor processors are organized in relation to another.

**Input or stimuli**

**Stage 1: Encoding**

**Stage 2: Comparison**

**Stage 3: response selection**

**Stage 4: Response execution**

**Output or response**

Question 2. When building mobile applications, it is important to note the device being used. Elaborate on four (4) limitations of mobile devices that may affect mobile applications design.

[12 Marks]

*3 marks for each (1 marks for the naming and 2 mark for explanation)*

**Sample answer**

**Small screen size**

Mobile users incur a higher interaction cost in order to access the same amount of information as users on desktop screens;

Users are forced to rely on their short-term memory to refer to information that is not visible on the screen. It's thus not surprising that mobile content is twice as difficult.

**Portability**

Because of their portability attention on mobile is often fragmented and sessions on mobile devices are short

**Single Window**

If users must move information from one app to another, it's likely that they will need to copy-and-paste it (or worse, rely on their memory and increase their cognitive load); the interaction will become more complex and error prone.

**Touch screen**

These suffer from low memorability and discoverability. Typing on tiny virtual keyboards is difficult and it's easy to accidentally touch the wrong target.

**Variable connectivity**

Even in the era of fast cellular networks and ubiquitous Wi-Fi, coverage is not universal or equally good. Every new page load translates into a significant waiting time when the network does not cooperate.

Question 3. List and describe any five (5) data gathering techniques used in the requirements activity.

[10 Marks]

*2 marks for each*

**Sample answers**

**Questionnaires**

**Interviews**

**Focus groups and workshops**

**Naturalistic observations**

**Studying documentation**

Question 4. Suggest one key functional, data, environmental, user and usability requirement for the following: A mobile application for the university's cafeteria that allows users to pay for their food using a credit system. [10 Marks]

*2 marks for each*

**Sample answers**

- **Functional:** the system will calculate the total cost of purchased items
- **Environmental:** students will be carrying trays and in a rush. The physical environment will be noisy and busy and users may be talking to friends while using the application
- **User:** the majority of users are likely under 24 and comfortable dealing with technology
- **Usability:** the mobile application needs to be simple so that users can use the application immediately, and memorable for more frequent users. Users wouldn't want to wait while the application finishes processing, so it needs to be efficient and to be able to easily handle errors.

### Section C

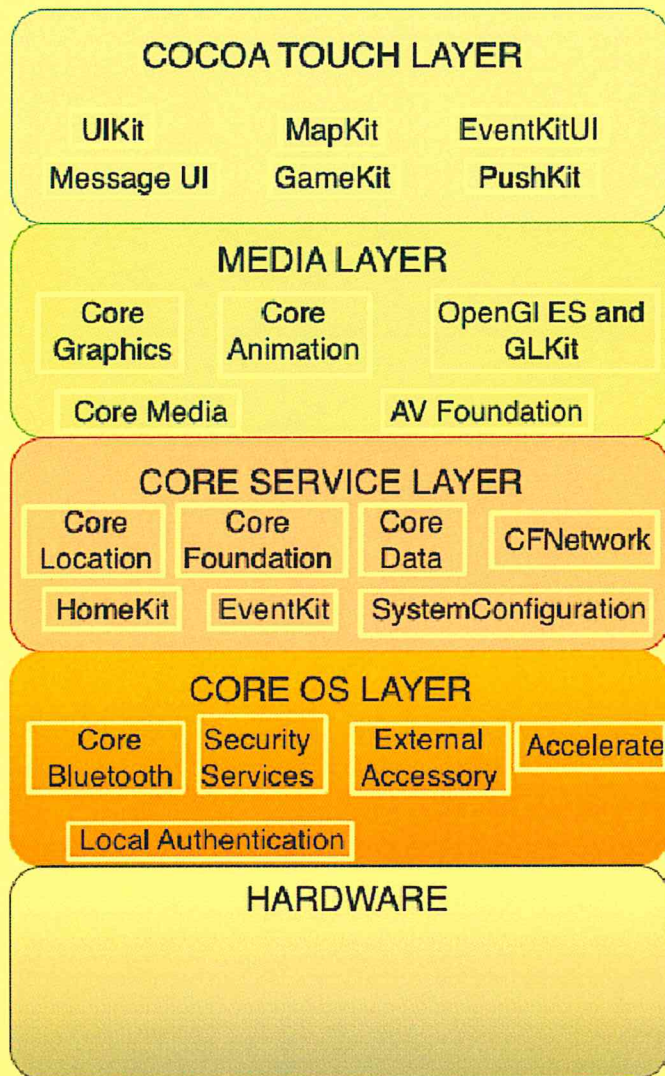
[42 Marks]

Question 1. Apples iOS platform is one of the most popular mobile platforms. Elaborate on the different layers of the iOS architecture. For each layer indicate two (2) components. [16 Marks]

*4 Marks per section (2 marks per component, 2 marks for naming section)*

The iOS architecture consists of the following layers:

- Cocoa Touch:** This layer deals with interaction between the user and the device. It also controls the interface of the application as well as how it will respond when a user engages with it. This layer houses high level iOS system capabilities such as multitasking and using the device touch screen to implement commands.
- Media:** This layer deals with audio, video and graphic frameworks to ensure a dynamic multimedia experience to the user. Exemplifying when creating applications with 3D graphics, animations or high quality audios. This layer consists of components such as media player framework, Core Audio for audio, Core Animation and AV kit for video in a nutshell.
- Core Services:** This layer provides technologies that are significant to supporting of the device applications. Despite that, not all services offered by this layer can be used by every application example social framework, health kit and cloud kit framework.
- Core OS:** This layer interacts directly with the hardware and also most functionalities provided by the three higher level layers are built upon this layer. Furtherly, it provides frameworks that an application can use directly such as security frameworks.



Question 2. Mobile applications have been used to address many problems in society. Community health workers, work within communities to assist with basic health care. They are especially important in those hard-to-reach areas of rural Namibia or the informal settlements within towns. They tend to navigate through different terrains and require a mobile device for their work. You are hired as a mobile designer and you are required to design a mobile paper prototype application. Consider the fact that community health workers may have different types of mobile devices and visit clients with varying network connectivity. Your prototype should have the following components: basic information per patient, security component, in-app calling, and emergency/critical patient alert.

- a. Apply your knowledge of layout design in Android or any other platform learnt to design and draw at least four (4) screens for the application. [10 Marks]

**Here students are supposed to make use of use of design principles of the chosen platform.**

**The navigation structure of the chosen platform.**

**Similarly how best the student meets the design brief is important.**

- b. Explain how you have made use of the gestalt principles in your design. [10 Marks]



*2 marks per gestalt principle*

- Proximity,
- Similarity,
- Continuity,
- Closure, and
- Connectedness.

- c. When working with data, some laws that need to be taken into consideration. Indicate how you would inform the community health workers of data privacy and protection within the mobile application. You may use GDPR as an example. [6 Marks]

*Sample answer*

**A good example of this would be to break down the contents of the data privacy policy such that all the different components are clearly articulated to the end user.**

**Informing the user of how the data collected is going to be used including the data retention policy.**