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University of Ruhuna - Faculty of Technology

Bachelor of Information and Communication Technology Honours Degree
Level 3 (Semester I) Examination, May/June 2024
Academic Year 2022/2023
Course Unit: ICT3142 – Mobile Computing Principles (Written)
Repeat Examination (Old Syllabus)

Answer **all four (04)** questions **Duration: 2 hours**

IMPORTANT INSTRUCTIONS

- This paper contains **four (04)** questions on three (03) pages.
- The medium of this examination is **English.**
- This is a **closed book** examination.
- Each question carries **equal 100** marks.
- Any type of calculators are not allowed in this examination.

Question 01 **[100 marks]**

"Mobile computing is a technology that allows users to wirelessly transfer data, voice, and video between devices, eliminating the need for fixed physical cables or connections."

a) State the concepts of Mobile Computing and briefly explain them.
[24 marks]

b) Describe what the term "Ubiquitous Computing" means with **two (02)** examples.
[20 marks]

c) Identify the main **four (04)** features of mobile computing and briefly discuss them.
[22 marks]

d) List down **four (04)** limitations in Mobile Computing.
[16 marks]

e) Provide a brief explanation of **three (03)** applications of mobile computing.
[18 marks]

Question 02 **[100 marks]**

a) "Spread spectrum is a method used for sending radio or telecommunication signals. It involves spreading the transmitted signal across the available frequency spectrum." Write down **two (02)** types of spread spectrum and briefly explain each type.

[18 marks]

b) "Bluetooth technology facilitates wireless communication between devices, enabling the transmission of data over short distances without requiring cables." State the **four (04)** modes of a Bluetooth connection.

[12 marks]

c) The IEEE 802.11 standard encompasses **three (03)** basic types of topologies for WLANs. List down them and provide **one (01)** significant characteristic for each.

[24 marks]

d) "Orthogonal Frequency Division Multiplexing (OFDM) is a unique variant of Frequency Division Multiplexing (FDM) multicarrier modulation technique. Orthogonal Frequency Division Multiplexing (OFDM) is more efficient than Frequency Division Multiplexing (FDM)." Justify this statement by providing a suitable reason.

[20 marks]

e) "The LLC (Logical Link Control) sublayer is a component of the Data Link Layer in the OSI (Open Systems Interconnection) model. It is responsible for managing communication links between devices on a network." Write down **four (04)** Logical Link Services offered by the LLC sublayer of the Data Link Layer and briefly describe **two (02)** of them.

[26 marks]

Question 03 **[100 marks]**

a) "Radio wave propagation is utilized in radio communication for transmitting signals over either short or long distances." State **three (03)** methods of radio wave propagation and briefly describe **two (02)** of them.

[25 marks]

b) Distinguish the main difference between Frequency Division Multiple Access (FDMA), Time Division Multiple Access (TDMA), and Code Division Multiple Access (CDMA) with the aid of appropriate diagrams.

[15 marks]

c) Write down **three (03)** primary benefits of the Assisted Global Positioning System (AGPS) compared to the Global Positioning System (GPS).

[12 marks]

d) "Location-based services (LBS) are services that utilize the geographical location of a mobile user as determined by the device." Briefly explain the **two (02)** types of Location-based services and provide an appropriate example per each type.

[20 marks]

e) "In cellular communication, handoff involves moving an ongoing call or data session from one cell within a cellular network to another, or switching from one channel to another."

   i) Briefly discuss **two (02)** types of handoffs utilized in cellular communications. [16 marks]

   ii) List down **four (04)** situations in which handoff activation can occur. [12 marks]

Question 04 **[100 marks]**

a) "Mobile IP is an open standard established by the Internet Engineering Task Force (IETF) RFC."

   i) Briefly describe the main purpose of Mobile IP. [10 marks]

   ii) List down the key mechanisms in Mobile IP. [12 marks]

b) "Ad-hoc networks and Infrastructure networks are two distinct types of wireless communication networks." Compare and contrast Infrastructure networks and Ad-hoc networks, mentioning at least **four (04)** factors. [16 marks]

c) "Wireless Sensor Network (WSN) is an infrastructure-less wireless network that has an ad-hoc nature as a wireless network."

   i) Provide a brief description of what a Wireless Sensor Network (WSN) is. [8 marks]

   ii) Write down **three (03)** characteristics of the Wireless Sensor Network (WSN). [12 marks]

d) "Hidden terminals or Hidden node problem is a technical challenge in the wireless communication networks."

   i) Briefly explain the hidden node problem in wireless networks. [10 marks]

   ii) Discuss the appropriate solution to address the above problem mentioned in part (d) (i). [10 marks]

e) State **four (04)** Wi-Fi network security issues and briefly explain **two (02)** of them. [22 marks]

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