Inspiring Innovation and Leadership

# KARATINA UNIVERSITY

## UNIVERSITY EXAMINATIONS
## 2023/2024 ACADEMIC YEAR

## THIRD YEAR SECOND SEMESTER EXAMINATION

## FOR THE DEGREE OF

## BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY

## COURSE CODE: BIT 324

## COURSE TITLE: MOBILE COMMUNACATION NETWORK

**DATE:26TH APRIL, 2024** **TIME: 12:00 – 2:00PM**

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**INSTRUCTION TO CANDIDATES**

- SEE INSIDE

*Instructions: Answer ALL Questions in SECTION A and ANY TWO in SECTION B*

**QUESTION ONE (1) is COMPULSORY (Carries 30 Marks)**

**SECTION A**

**QUESTION 1: (COMPULSORY) 30 MARKS**

a) Compare and contrast technological advancements between 1G, 2G and 3G mobile technologies. (3 marks)

b) In wireless communication, it is important to focus on modeling input/output behavior of a channel, rather than individual behavior of each signal path. Explain two models that are used in modeling Input/output models of wireless channels. (4 marks)

e) Explain any TWO limitations of mobile computing environments, that could affect access to services in a remote village. (2marks)

d) Mobile communication is resource constrained. Therefore, it requires special operating environment which translates TCP/IP protocols into an equivalent of wireless applications environment. Using a model diagram, discuss how the WAP architecture seamlessly integrates www internet applications. (4 marks)

e) In reference to Cellular Digital Packets Data (CDPD) system, explain any TWO functions of Sub-network Dependent Convergence Protocol, at the network layer. (2 marks)

f) Explain any THREE improvements of mobile IPV6 that has solved the challenges raised in Mobile IPV4. (3 marks)

g) Explain how Frequency reuse help channel allocation of cellular systems. (4 marks)

h) In reference to any TWO upper layers of TCP/IP describe key security considerations that guarantee the safety of processes in mobile applications. (4 marks)

i) With example explain the difference between Advanced Mobile phone Service (AMPS) and Global system for Mobile Communications (GSM) (4 marks)

**SECTION B - ANSWER ANY TWO (2) QUESTIONS (Carries 40 Marks)**

**QUESTION TWO: 20 MARKS**

a) Differentiate between mobility and wireless terminologies as used in mobile computing. (2 marks)

b) Distinguish between location management with location update and location management with paging. (2 marks)

c) Many a times we visit overcrowded places such as graduations ceremonies for university students or even when police officers are graduating, we have had cases where by family, relative and friends of individual graduating fail to meet the graduand or even each other because during that time calls fails to go through, sometime calls terminate and fail to connect again. To reduce force termination and promote call completion channel assignment scheme have been proposed. Using a diagram discuss four channel assignment schemes that have been proposed (5 marks)

d) Explain Three reasons for a handoff to be conducted in mobility management. (3 marks)

e) Explain the following handover types use illustration where possible (4 marks)

i) Inter-cell handoff
ii) intersystem handoff

f) Discuss THREE strategies used in handoff detection. (3 marks)

## QUESTION THREE (20 MARKS)

a) Using diagram where necessary, describe in detail the following occurrence of media access in mobile computing.

i. Exposed Terminals (2 Marks)
ii. Hidden Terminal (2 Marks)
iii. Near and Far Terminal (2 Marks)

b) Explain the steps involved in the call delivery procedure in GSM network in the following cases: (4 marks)

i. GSM mobile terminated call
ii. GSM mobile originated call

c) Using a diagram, illustrate the three-phase operation during the hand over process in mobility management. (3 marks)

d) Describe Four aspects that are addressed by IS-41 Network Signaling system (4 marks)

e) Explain how starvation can be avoided in all multiple access schemes. (3 marks)

## QUESTION FOUR (20 MARKS)

a) Explain the following mobile computing concepts (6 Marks)

i. User mobility
ii. Bearer mobility

iii. Session Mobility

b) Discuss two approaches that have been proposed to reduce the "cost" of deregistration in roaming management. (4 marks)

c) Using a diagram describe the components of SS7 architecture. (6 marks)

d) Explain four dimensions in which multiplexing can be carried out in wireless communication. (4 marks)

**QUESTION FIVE (13 MARKS)**

a. John Travelled to France for a holiday. While in France John was able to check balance on his mobile phone, he could also receive calls and short messages as well as send and call his family back home in Kenya using his Safaricom Line. This can be explained using roaming management in mobility; thus, one is able to make calls or even receive messages while outside his or her geographical region. Using a diagram discuss the three key components of signaling system 7 (SS7) network that necessitated John to make and receive calls and messages while in France. (6 marks)

b. Explain three reasons for a handoff to be conducted in mobility management. (3 marks)

c. Using a diagram, describe the IP mobile registration process indicating clearly all entities involved in registration process. (4 marks)

d. Explain any THREE problems associated with Mobile IP allocation. (3 marks)

e. Compare the working of FDMA and TDMA schemes. (4 marks)