



(Knowledge for development)
**KIBABII UNIVERSITY
(KIBU)**

**UNIVERSITY EXAMINATIONS
2022/2023 ACADEMIC YEAR**

**END OF SEMESTER EXAMINATIONS
YEAR THREE SEMESTER ONE EXAMINATIONS**

**FOR THE DEGREE OF BACHELOR OF SCIENCE
(INFORMATION TECHNOLOGY)**

**COURSE CODE : BIT 311
COURSE TITLE : WIRELESS AND MOBILE
COMPUTING**

DATE: 14/12/2022

TIME: 2.00 P.M – 4.00 P.M

INSTRUCTIONS TO CANDIDATES

ANSWER QUESTIONS ONE AND ANY OTHER TWO.

QUESTION ONE [COMPULSORY - 30 MARKS]

- (a) State the meaning of the following terminologies applicable in wireless and mobile computing
- (i) Wireless Local Loop [1 mark]
 - (ii) Bandwidth [1 mark]
 - (iii) Handoff [1 mark]
- (b) Wireless networks consist of various network elements in their architecture
- (i) State and briefly describe three key elements and their roles in wireless networks [6 marks]
 - (ii) Distinguish between infrastructure mode and ad hoc mode in terms of network elements in wireless networks [4 marks]
- (c) (i) List three underlying systems required for setup of wireless local loops [3marks]
- (ii) In the setup of wireless local loop deploying CDMA technology, the amount of power received at the cell site from every house is 1.5dB. If the total number of houses in a cell is 30, and assuming the voice activity factor is 0.4, compute the in-cell interference generated in the cell [2 marks]
 - (iii) What is the effect on high in-cell interference [2 marks]
- (d) (i) State the two communication protocols that are deployed by 802.11 standards [2marks]
- (ii) The extended client-server model facilitates mobile client-server information access. State two distinguishing features that allows to achieve this [2marks]
- (e) Mobile aware adaptation is based on three approaches. State and briefly discuss each approach [6marks]

QUESTION TWO [20 MARKS]

- (a) What is the meaning of the following terminologies in wireless and mobile computing
- (i) Wireless LAN [1 mark]
 - (ii) Latency [1 mark]
- (b) Illustrate using diagram and discuss the four major mobility tasks performed in 4th Generation (4G) mobile networks [6 marks]
- (c) The IEEE 802.11 group of standards specify the technologies for wireless LANs. List the three categories and briefly discuss the distinguishing features in terms of frequency and data rates [6marks]
- (d) (i) State three key issues that mobile data access needs to address in mobile computing [3 marks]

- (ii) Rate adaptation is an advanced capability of 802.11 standard in mobile computing. Briefly describe this phenomenon in relation to changes in transmission rate and SNR [3 marks]

QUESTION THREE [20 MARKS]

- (a) State the meaning of the following applicable terms applicable in wireless and mobile computing
- i. Bluetooth [1 mark]
 - ii. Long Term Evolution [2 marks]
- (b) (i) List four key areas in WiFi network management applicable in wireless and mobile computing [4marks]
- (ii) Discuss four security vulnerabilities inherent in wireless and mobile networks [4marks]
- (c) What are the three goals of development of routing protocols? [3 marks]
- (d) State and discuss four factors that motivated emergence of mobile IP technology in wireless and mobile computing [6 marks]

QUESTION FOUR [20 MARKS]

- (a) State the meaning of the following terms applicable in wireless and mobile computing
- (i) Mobile Middleware [1 mark]
 - (ii) Virtual Private Network (VPN) [1 mark]
- (b) (i) Examine three issues arising from routing and mobility in relation to finding a path from a source to destination [3 marks]
- (ii) LTE mobile may put radio to “sleep” to conserve battery. Discuss the two sleep modes [4 marks]
- (c) (i) Briefly enumerate the three specific goals for evolution and development of 5G over 4G mobile generation. [3 marks]
- (ii) Discuss the three key features of 5G new radio (NR) in 5G mobile computing technology [3 marks]
- (d) Illustrate using a diagram the four step handover process between base stations in the same cellular network [5 marks]

QUESTION FIVE [20 MARKS]

- (a)** State the meaning of the following terminologies applicable in wireless and mobile communication
- i. Satellite network **[1 marks]**
 - ii. Client cache **[1 marks]**
- (b)** (i) Differentiate between hard hand-off and soft hand-off in mobile communication **[4 marks]**
- (c)** (i) Middleware functions can be divided into three main categories. List the three categories **[3 marks]**
- (ii) Mobile middleware involves several services in mobile networks. List five applicable services **[5 marks]**
- (d)** Illustrate using the diagram the process of sending and receiving frames using CSMA/CA in IEEE 802.11 MAC protocol. **[6 marks]**