

University of Barishal
Department of Computer Science and Engineering
Course Title: Mobile Computing
Course Code: CSE-4225
4th Year 2nd Semester Final Examination 2022
Admission Session: 2018-2019

Time: 03 Hours

Marks: 60

N.B.: Answer any **FIVE** questions out of the following. All parts of each question must be answered consecutively. Right side of the question shows the maximum marks.

1.a) The telco service operators should improve the indoor network connectivity as call discontinuation and call drop are quite common in this regard. What are the terms associated with this and how to improve this situation? 4

b) Draw the structure of Infrastructure networks and Ad-hoc wireless networks. Differentiate between the pros and cons for each. Mention major challenges in design, deployment, and performance of Ad-hoc network. 8

2(a)) *A wireless sensor network (WSN) is a wireless network consisting of spatially distributed autonomous devices using sensors to cooperatively monitor physical or environmental conditions, such as temperature, sound, vibration, pressure, motion or pollutants, at different locations. In short, it is a collection of sensing devices that can communicate wirelessly.* 8

You are required to design a real-time air quality monitoring system. You must answer the following:

- Identify the IoT device required.
- Draw a block diagram with the components used in the design.

2(b)) Describe the architectural layers of mobile computing with a neat diagram. 4

3(a)) You need to design a distributed system aimed at significantly enhancing performance. To do so, answer the following: 8

- Define the term distributed computing with figure.
- Define the term scalability with figure.
- Mention pitfalls when developing distributed system.

3(b)) List two applications that are not based on context aware system on your mobile phone and how to transform into context aware. Mentions the benefits. 4

4.a) Suppose you are appointed as System Designer of a renewed IT company. As a part of job responsibility, you have been assigned to a project namely "OrderNinja". As System Designer, how would you redesign the database architecture to address the challenge of dual synchronization between mobile and central databases, ensuring offline functionality, data consistency, conflict resolution, and scalability? 8

b) Explain the pros and cons of client-server and peer-to-peer mobile databases with figures. 4

5.a) With the help of a neat block diagram, describe the logical functions of mobile computing, highlighting the roles of mobile devices, communication networks, centralized servers, synchronization management, and user interfaces. 4

b) Depict the registration process of Mobile system when it is moving from VLR to another VLR. 6

c) What is UI? Differentiate between UX and UI. 2

6.a) How is file-sharing managed in the Coda distributed file system? Illustrate with a timing diagram. 5

b) Global system for mobile communication (GSM) based wireless sensors networks (WSN) are globally used for different industrial applications. Consider GSM modules are deployed at three different sites of oil exploration in Country-A and connected with the cellular network to monitor the environment effects. Discuss the architecture of such WSN that relates to the cellular network and sketch its labelled diagram to support your answer. 5

c) What do you mean by context-aware computing? 2

7.a) One of the course objectives is to understand and design mobile networks. As a design and planning engineer, your task is to create a wireless network that covers the CSE departmental classroom at the University of Barishal, spanning 15 acres. The network must support both voice and data services and provide seamless indoor and outdoor coverage, considering the area's demographics. Mobile device usage introduces a variety of challenges, which you've explored in this course. Your response should detail the decisions you're making for the network design and the reasoning behind those choices. Now, address the following questions.

- Draw the complete architecture and mention all the network components in detail.
- Identify the protocols that your network will support.
- Indicate the frequency reuse factor cluster size.

b) What do you know about cluster and grid computing? Explain with necessary diagrams. 4

8.a) Explain the following on the MIMO systems: 4

i) Massive MIMO system ii) What is the relation with 5G

b) Write short notes on (any three): 6

- i) Security and Privacy issues in mobile communication
- ii) Cellular IP
- iii) Internet of things (IoT)
- iv) Wearable computing

c) Write advantages and disadvantages of cellular systems. 2

"Life is like riding a bicycle. To keep your balance, you must keep moving."

- Albert Einstein