Important Instructions:

1) **Open this MS-Word document and start writing answers below each respective question given on page 2.**
2) **Answers the question in the same sequence in which they appear.**
3) **Provide to the point and concrete answers.**
4) **First read the questions and understand what is required of you before writing the answer.**
5) **Attempt the paper yourself and do not copy from your friends or the Internet. Students with exactly similar answers or copy paste from the Internet will not get any marks for their assignment.**
6) **You can contact me for help if you have any doubt in the above instructions or the assignment questions.**
7) **All questions must be attempted.**
8) **Do not forget to write your name, university ID, class and section information.**
9) **Rename you answer file with your university ID# before uploading to SIC.**
10) **When you are finished with writing your answers and are ready to submit your answer, convert it to PDF (no MS Word) and upload it to SIC unzipped, before the deadline mentioned on SIC.**
11) **Do not make any changes to the format provided.**
12) **Failure in following the above instructions might result in deduction of marks.**

Final Exam, Course: - Mobile Computing

Deadline: - Mentioned on SIC **Marks: - 50**

Program: - BS (CS), BS-SE **Dated: 24 June 2020**

Student Name: Muhammed Omer **Student ID#:13000**

Class and Section: BS(SE)

Q1: Provide the names of 4 challenges that exist in Adhoc Networks. (4)

Ans:

- **Infrastructure-less design**
  Infrastructure-less design adds difficulty in fault detection and management.
- **Dynamic topology**
  Dynamic topology results in route changes and packet loss.
- **Scalability**
  Scalability is still unsolved, challenges include addressing, routing, configuration management, interoperability, etc.
- **Energy constraints**
  Energy constraints limit processing power; ad-hoc networks rely on each node being a "router".

Q2: How the nodes in the Adhoc Network know about the changing network topology. (2)

Ans: The nodes in the Adhoc Network moves freely thats why nodes know about the changing network topology.

Q3: Why is it important to minimize flooding of control packets in Adhoc Networks and how MPR achieves it? (4)

Ans: MPR nodes have specific functionalities of performing topological advertisements as well as broadcasting and forwarding of control messages, with the goal to reduce the impact of message flooding and control overhead. The objective of the MPR technique is to reduce the number of redundant retransmissions, while ensuring reliable delivery of broadcast messages. After this selection is completed, messages are broadcasted, and

control messages as well as traffic data that all packets should transmit through MPR nodes are identified.

Q4: Explain briefly how Mobile Cloud Computing is different than simple mobile computing and simple cloud computing? (4)

Ans:

Mobile Cloud Computing

Mobile Cloud Computing at its simplest refers to an infrastructure where both the data storage and the data processing happen outside of the mobile device. Mobile cloud applications move the computing power and data storage away from mobile phones and in to the cloud, bringing applications and mobile computing to not just smart phone users but a much broader range of mobile subscribers.

Simple Mobile Computing

Mobile computing is human–computer interaction in which a computer is expected to be transported during normal usage, which allows for transmission of data, voice and video. Mobile computing involves mobile communication, mobile hardware, and mobile software.

Simple Cloud Computing

In the simplest terms, cloud computing means storing and accessing data and programs over the Internet instead of your computer's hard drive. The cloud is just a metaphor for the Internet.

Q5: Explain the term MBaas in your own words? (4)

Ans: MBaaS stands for Mobile Backend as a Service. It provide way to connect applications to backend cloud storage and processing. It also provide common features such as user management, push notifications, social networking integration, and other features.

Q6: Imaging you visit a completely new city. What kind of services a modern LBS can provide you at your location automatically? (6)

Ans: Location-based services (LBS) use real-time geo-data from a mobile device or smartphone to provide information, entertainment or security. Google Maps, Foursquare, GetGlue, Yelp and Facebook Places are among the more popular services.
Morover through LBS we can find nearest store location. Traffic updates and weather reports are also provided by LBS. There are alots of apps that provide roadside assistance.

Q7: Use your imagination as to how the following context can be used by a context aware application in mobile computing environment?

(8)

Date/Time
Environment
Emotional state
Focus of attention
Orientation
User preferences
Calendar (events)
Browsing history

Ans:

Date/Time

Date and Time are the most common in use in a wide range of applications. They are used to organise both digital and analog content and offer an easy way of searching and retrieving the relevant content automatically. For example many cameras automatically add date and time to photographs.

Environment

Context in mobile systems may also come from the environment. Examples of dynamic environmental context include current road traffic (i.e., estimated travel time through road segments), time, weather.

Emotional state

Scientific findings suggest that emotion plays a significant role in producing rational behavior and rational decision-making. Measurements like blood volume (BVP), heart rate (EKG), galvanic skin conductance (SC), and respiratory rate are commonly used in emotion state.

Focus of attention

If the mobile device is fun to operate, then focused attention may result. Focused attention increases enjoyment in interacting with the mobile device.

Orientation

Modelling context using object-oriented techniques offers the full power of object orientation (e.g. encapsulation, reusability and inheritance). Existing approaches use various objects to represent different context information (such as temperature, location, etc.), and encapsulate details of context processing and representation.

User preferences

User profiles can include user preferences about presentation layout and requirements for the quality of service (QoS), while device profiles specify the MIME media types and physical characteristics of a device, including screen size, memory size, operating system, as well as supported markup language.

Calendar (events)

The calendar event creation module may identify one or more slots in the text of the natural language expression related to the calendar event using a first grammar module and a second grammar module.

Browsing history

The browsing history is context module through history can be viewed and deleted

Q8: Explain why energy efficiency is important in technologies like Bluetooth and ZigBEE? (4)

Ans: Energy efficiency is especially important for end sensory devices with limited energy sources, which are connected by means of so-called wireless sensor networks (WSN). The WSNs, thus, create a periphery of an IoT domain, which interacts with the environment. In WSNs, there is a number of cases in which the device topology contains a central node that collects and evaluates acquired data from sensory devices, such as parking cameras or hospital equipment.

Q9: Explain briefly how you use RFID technology at INU on a daily basis when present on the campus? Do you use an active or passive tag? (4)

Ans: Radio Frequency Identification (RFID) is getting popularity among identification technologies owing to its low cost, light weight, reduced size and inexpensive maintenance. The emerging technology of RFID can be used for building a smart university.

If RFID is to be implemented at INU the system will be responsible of taking care of maintaining attendance record, switching control of electrical items and security locks of rooms. Results show that consumption of energy and object tracking time is decreased while security of rooms and credibility of attendance record are increased.

The benefits of using RFID technology in development of smart university. The developed prototype system shows how emerging technology of RFID can contribute in improving security, power conservation, person tracking etc.

RFID technology provides the means of identification of persons or objects and forms the basis of:

- employee attendance record maintenance
- employee/equipment tracking
- room security
- automation of electrical appliances, etc.

INU will be smart university with RFID. To start with, several actors and assets should be tagged:

- Each employee will be tagged using smart employee card
- Each student will also be tagged having their unique ID i.e. roll numbers
- Different office items will be tagged using RFID based labels
- Each office, classroom, lab will be assigned a unique ID that will be stored in RFID reader unit .

Furthermore, RFID reader units are placed at strategic places as follows:

- RFID reader unit will be placed next to the door of each room
- Reader unit will also be placed at the University entrance and exit
- University cafeteria and common rooms will be equipped with reader node
- Labs and classrooms will also be having at-least one reader at the entrance and exit

Q10: Explain how Wearable Computing can be employed in computer gaming? (5)

Ans: A wearable computer is any small technological device capable of storing and processing data that can be worn on the body. Wearable computers are designed for accessibility and convenience, as well as improvements to workplaces by making information quickly and readily available to the wearer.
In game studies , Aarseth in 2000 consider the space as an important issue for computer game analysis. Flanagan in 2009 offer locative games.
Using the idea of space to understand computer games it is possible to oppose the locative game genre to the video game genre. The ubiquitous computing paradigm gave birth to two important digital technologies that are currently available. Wearable computers are connected to smart phones and game app on internet.

Q11: What kind of facilities and technologies must be present in order to call you own home a Smart Home? (5)

Ans: A smart home is a residence that uses internet-connected devices to enable the remote monitoring and management.

Light Automation: When it comes to light automation there are two options. The first is installing smart light switches.

Video Door Bells: Video doorbell not only sense, and alert you when someone is at the front door, but can also show you video footage of who is there, and can use intercom technology to talk to your visitor.

Smart Thermostats: With smart thermostats, you can monitor your HVAC from wherever you are. You can also set them on a schedule so that energy isn't wasted when no one is home.

Smart TVs: Smart TVs are great because you can watch basically anything you want, whenever you want, whether you have cable or not.

Smart Refrigerators: Smart refrigerators vary in capability. They can tell you how often they are being accessed, alert you if a door is left open, let you know what products you need to buy, and a few models even have monitors that can stream TV.

Smart Dishwashers: Smart dishwashers run on very similar apps as smart ovens and app compatible smart fridges.