

## CE1.5-R4: MOBILE COMPUTING

### NOTE:

1. Answer question 1 and any FOUR from questions 2 to 7.
2. Parts of the same question should be answered together and in the same sequence.

Time: 3 Hours

Total Marks: 100

1.
  - a) List the limitations of mobile devices.
  - b) Briefly explain the concept of cell splitting and cell sectoring in mobile communication access.
  - c) How mobile devices and Mobile IP work together in case of multiple network environments?
  - d) Draw a block diagram of Bluetooth protocol stack and write application of each layer.
  - e) What is the use of Indirect TCP in mobile wireless system? Also write the limitations of I-TCP.
  - f) List the type of services offered by GSM architecture and explain each in brief.
  - g) List the common and well-known Mobile operating systems available in the mobile devices. Explain any two with their distinct features.

**(7x4)**
  
2.
  - a) Explain the key characteristic of a cellular network to re-use the frequencies for increasing coverage and capacity of the network. Give one example how to calculate frequency reuse factor.
  - b) If a total of 33 MHz of bandwidth is allocated to a particular cellular system which uses two 25 KHz Simplex channels to provide full Duplex voice. Compute the number of channels available per cell if the system uses: (i) 4 cell reuse (ii) 7 cell reuse

**(9+9)**
  
3.
  - a) Define applications of Mobile Database Systems (MDS) in wireless network and write different issues associated with it. State the limitations and challenges to implement MDS.
  - b) What is use of mobile agent in mobile technology? What is the activity taken care by the mobile agent? Give different approaches used by mobile agent in wireless network.

**(9+9)**
  
4.
  - a) Draw a programming model for World-Wide-Web (WWW) architecture. Explain what significant enhancements made for WAP model to benefit the application developer community. Briefly point out the types of content and protocols in WAP model to get the optimum services for mass market and hand-held wireless devices.
  - b) What are the basic components of the WAP architecture? Draw WAP stack architecture and explain the significance of each network layer in details.

**(8+10)**
  
5.
  - a) For existing GSM network, what are the noteworthy changes required to be performed for 3G network services? Explain the issues and technology used in 3G system and also compare with other GSM standards.
  - b) Briefly explain the following elements in core network Circuit Switched (CS) domain:
    - i) Mobile Switching Center/Gateway Mobile Switching Center (MSC/GMSC)
    - ii) Media Gateway/Mobile Switching Center (MGW/MSC) Server
    - iii) Signaling Gateway (SGW)

- c) How the data retransmit or recovery will happen in TCP and also explain the TCP freezing condition in mobile wireless system.

**(9+6+3)**

**6.**

- a) What do you mean by mobility? What are the different kinds of mobility generally defined in network system?

- b) Differentiate the following terms with respect to mobile networking.

i) FHSS (Frequency Hopping Spread Spectrum) **Vs** DSSS (Direct Sequence Spread Spectrum)

ii) Hard handoff **Vs** Soft handoff

- c) A certain city has an area of 1300 square miles and is covered by a cellular system using a seven cell reuse pattern. Each cell has a radius of 4 miles and the city has 40 MHz spectrum with a full duplex channel bandwidth of 60KHz. Find:

i) The number of cells in the service area.

ii) The number of channels per cell.

iii) Total number of subscribers that can be served.

**(6+6+6)**

**7.** Write short notes on following:

- a) Classification of Mobile Ad-hoc networks

- b) IEEE 802.11 standards for mobile wireless network

- c) Security issues and protection techniques in mobile computing

**(6+6+6)**