

BE11-R4: WIRELESS & MOBILE COMMUNICATIONS

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) Define the terms LAN, MAN, WAN and PAN. Give the names of the IEEE standards for wireless MAN and wireless PAN.
- b) Differentiate between the WCDMA (UMTS) and the CDMA2000 3G standards.
- c) Describe in brief the three basic radio wave propagation models. How do they affect the received power?
- d) Explain the goals, key design characteristics and applications of the Wi-MAX standard in brief.
- e) List the multiple access technologies used by 1G, 2G and 3G mobile service providers in North America and Europe. Define them.
- f) Explain in brief the design goals for the CT2, DECT, PACS and PHS systems.
- g) Compare Wi-Fi and 3G technologies for broadband data access.

(7x4)

2.

- a) Explain the near-far problem. Why do we need power control with CDMA and not with FDMA or TDMA?
- b) How does the IS-95 CDMA standard in North America ease the transition from the 1G AMPS System? Why is a frequency reuse factor of 1 possible for this system?
- c) Describe the architecture of a GSM system. Explain the function of each entity in the architecture.

(4+4+10)

3.

- a) What are CDC and CLDC? Differentiate between them.
- b) List the reasons for the development and popularity of SMS.
- c) Explain the causes of and factors affecting small scale fading and large scale fading.

(4+4+10)

4.

- a) Discuss WLL. Explain the reasons for its popularity in developing countries.
- b) Explain the TDMA technology. What are its main advantages over analog FDMA?
- c) Briefly describe the IEEE 802.11 family of standards, specifying the frequency band used and maximum data rate supported by each standard. Explain the infrastructure mode architecture of 802.11. Discuss the FHSS mode physical layer.

(4+5+9)

5.

- a) Define the term spread spectrum. Discuss FHMA and CDMA. List the advantages and disadvantages of CDMA.
- b) Explain CSMA/CA and virtual carrier sense as used in 802.11 with the help of figure(s).

(9+9)

6.

- a) Describe the free space propagation model. Write the equation for received power at the receiver in terms of received power at a reference distance d_0 and the actual distance between the transmitter and the receiver d . Describe the ground reflection (two-ray) propagation model. Write the equation giving received power at the receiver in terms of transmit power, antenna heights and gains and the actual distance between the transmitter and the receiver d . What is the significance of the power of d in the equation?
- b) Compare and contrast Palm OS, Windows CE OS and Symbian OS.
- c) An FDD cellular system has 21 MHz bandwidth allocated to it, of which 1 MHz is used for control channels. If one duplex voice channel requires 40KHz bandwidth and voice channels are distributed equitably among the cells, calculate the number of voice channels that can be allocated to each cell for frequency reuse factors of 4, 7 and 12.

(6+6+6)

7.

- a) Explain the ALOHA and slotted ALOHA techniques. What benefit does the latter offer over the former?
- b) How does EDGE enhance the data rate for a 2.5G GSM system over 2G GPRS? Explain the mechanisms.
- c) List the factors affecting the handoff decision. Differentiate between soft handoff and hard handoff. Explain prioritized handoff.

(6+6+6)