B3.5-R3: NETWORKING AND MOBILE COMMUNICATIONS

NOTE:

1. Answer question 1 and any FOUR questions from 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) Why do not other RF (Radio Frequency) devices interfere with Bluetooth Devices?

b) How does a WAP Gateways act as a bridge between the mobile world and the Internet? Draw a simple diagram showing how the WAP gateway interfaces with wireless devices.

c) What are the different ways in which radio waves can propagate? Mention the role of the radio wavelength where it is relevant. What causes multi-path interference?

d) What is the difference between a LAN and a PAN? Why is 802.11 inappropriate for a PAN?

e) In each GSM multi frame, 24 frames are used for traffic and two for associated control signaling. Considering the detailed burst frame and multi frames infrastructures, explain, how the effective transmission rate for each GSM voice traffic is 22.8 kbps.

f) How does CDMA system use signals that arrive in the receivers with different time delays?

g) Compare and contrast the various 2.5G technology paths that each of the major 2G standards provide. Which path has the highest Internet access speed?

(7x4)

2.

a) How is signaling protocol in GSM structured into layers? What are the specific functions performed by Layer 3 of the GSM signaling protocol?

b) What are the various strategies implemented to avoid interferences in TDMA, FDMA & CDMA systems.

c) If a normal GSM time slot consists of six trailing bits, 8.25 guard bits, 26 trailing bits and two traffic bursts of 58 bits of data, find the frame efficiency.

(9+5+4)

3.

a) Explain the data transfer services that OSI defines for the discrete data components passed across the interface and between peer entities.

b) What is mobile IP? Explain with the help of a neat diagram how a mobile user remains on line irrespective of his current position.

(9+9)

4.

a) Summarize the main features of 3rd generation mobile phone system. How do they achieve higher capacities? How does UMTS implement asymmetrical communication and different data rates?

b) Discuss the problems of hidden and exposed terminals. What happens in the case of such terminals if ALOHA, slotted ALOHA or MACA is used?

(9+9)

5.

a) Why do we need different MAC schemes for wireless LANS? Explain briefly the hidden and exposed terminal problem associated with CSMA/CD.

b) Using QPSK modulation and convolutional coding, the IS-95 digital cellular systems require $3dB < S_r < 9$ dB. The bandwidth of the channel is 1.25 MHz., and the transmission rate is R = 9600 bps. Find the capacity of a single cell IS-95 cell.

c) For a cluster of size N, how many total channels are available if each cell is allocated a group of k channel in a Cellular System using FDMA?

(6+6+6)

6.

a) Why is TDM/TDMA technology widely used in most of the VSATs installed globally? How can the frequency carrier be assigned between any two VSATs on a demand basis?

b) Differentiate between Circuit Switched Data Services and Packet Switched Data Services on Cellular Networks.

c) Explain how VSATs can be used for one-way data systems (only the downlink). For what application is this useful and why?

(6+9+3)

7.

a) Explain briefly the types of links available with Bluetooth network.

b) Explain why public key encryption requires fewer keys than secret key encryption. Given two prime numbers p= 37 and q=23, define the private and public key by soliciting appropriate value of the number e.

c) What are the factors that govern use and reuse of spectrum for WiLL? How does modulation efficiency influence use and reuse of spectrum?

(4+7+7)