Eighth Semester Examination – 2008

MOBILE COMMUNICATION

Full Marks – 70

Time : 3 Hours

*Answer Question No. **1** which is compulsory and any **five** from the rest.*

The figures in the right-hand margin indicate marks.

Due credit will be given to neatness in answering and drawing suitable figures

1.   Answer in short to point :   2 ×10

(a)   Differentiate the functionality of chordless telephones and modern cellular telephone.

(b)   List the characteristics of AMPs based mobile cellular system. What were its demerits ?

(c)   Any modern cellular systems should provide higher priority to handoff than call setup. Why ?

(d)   Which type of modulation receiver is preferable in cellular systems : coherent or non-coherent ? Justify.

(e)   A channel with 10MHz bandwidth had a NSR of 20dB. Can this channel be suitable for Wireless LAN offering 54Mbs data rate ?

(f)   A fast moving vehicle can't receive signal transmitted at slower rate but can receive signal transmitted at higher data rate. Why ?

(g)   In a 3-dimenstional plane containing time, frequency and code draw the variation of parameters in TDMA, FDMA and CDMA techniques.

(h) Is it possible to use adaptive equalizer in AMPS based cellular systems ?

(i) Differentiate FH-SS and DS-SS techniques.

(j) List at-least 4features of GSM mobile systems.

2. (a) Discuss how the size of cell and the number of cells in a cluster affect the capacity of a cellular system. 5

(b) Derive the relationship for the co-channel reuse ration in terms of the cluster size and hence determine the signal to interference ration in a cellular system. 5

A cellular system is designed to provide a SIR = 17dB in the forward channel. What is the frequency reuse factor and cluster size for achieving maximum capacity, if path loss exponents are (i) 3 and (ii) 3.5. List the assumptions made in the analysis. 5

3. (a) Show how cell sectoring and cell splitting helps to enhance the capacity of a cellular system. 5

(b) Discuss different handoff strategies used in modern mobile cellular communication systems. 5

4. (a) An airplane travelling at a speed of 850 kmph communicates with the ground station at 350MHz. Determine the maximum and minimum Doppler frequency spread for the signal from the plane. Derive the relationship used. 4

(b) Derive the equation for path loss in mobile communication system where the receiver receives two signals one direct

line of sight and a ground reflected wave-form. Modify this to show the path loss in dB and comment on how it depends on distance of separation. 6

5. (a) Discuss the process of generation of QPSK signal and derive the relationship for transmitted waveform. List the limitations of QPS which are overcome in $\Pi/4$ QPSK. Show the spectrum of $\Pi/4$ QPSK signal if the transmitted data is 100 Kbps. 5

(b) List similarities and differences between MSK and GMSK methods of modulation. List their relative merits and demerits for cellular communication. 3

(c) A sequence of bits 10100101111 is to be transmitted using FM. Draw the typical waveform after modulation. 2

6. (a) Define processing in DS-SS technique. Analyze how spread spectrum systems counter narrowband interference. 5

(b) Draw the diagram of a linear equalizer for digital communication channel. Show the process of weight update for this equalizer using any one of the update algorithms. 5

7. Define frame efficiency for a multiple access system. List the relative merits and demerits of FDMA and TDMA systems.

A TDMA system uses 6 trailing bits 8.5 guard bits and two sets of 26 training bits for each slot in a frame. Each slot carries the data for only one use in the form of 3blocks of 58 bit data bits. 8 users are accommodated in one TDMA frame. Each TDMA frame has addition-ally 20 bits preamble and 8 trailing bits. Draw

the frame structure for this system. Find the frame efficiency. If each frame occupies 4.1ms calculate the data rate transmitted. 10

8. Write notes : 2.5×4

   (a) Wireless networking

   (b) Frame structure in GSM

   (c) CDMA multiple access

   (d) Diversity in mobile reception.

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