

Total number of printed pages – 7

B. Tech

CPEC 5404

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 ?

P.T.O.

- (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-dimensional 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 4 features 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 waveform. 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 100Kbps. 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 user in the form of 3 blocks of 58 bit data bits. 8 users are accommodated in one TDMA frame. Each TDMA frame has additionally 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.