EC–801(N)

B. E. (Eighth Semester) EXAMINATION, June, 2011

(Electronics & Communication Engg. Branch)

ADVANCED COMMUNICATION SYSTEM

[CE – 801(N)]

Time : Three Hours

Maximum Marks : 100

Minimum Pass Marks : 35

Note : Attempt any *five* questions. All questions carry equal marks. Assume suitable data if any missing.

1. List four significant factors which influence the choice of speech coder in mobile communication systems. Elaborate on the tradeoffs which are caused by each factor. Rank order the factors based on your personal viewpoint and defend your position.

2. (a) In an adaptive PCM system for speech coding, the input speech signal is sampled at 8 kHz and each sample is represented by 8 bits. The quantizer step size is recomputed every 10 ms, and it is encoded for transmission using 5 bits. Compute the transmission bit rate of such a speech coder. What would be the average and peak signal to quantization noise ratio of this system ?

(b) How many full rate physical channels per cell can a GSM system accommodate ?

3. Prove that the GSM system allocates gross RF data rate of 33·854 kbps/user. Show this by summing up the individual user data rate for :

(a) The speech order

(b) Speech error protection

(c) SACCH

(d) Guard time, ramp-up and synchronization

4. Consider a GSM system with a one way spectrum of 12·5 MHz and channel spacing 200 kHz. There are three control channels per cell and the reuse factor is 4. Assuming an omnidirectional antenna with six interferers in the first tier and slope for path loss of 45 dB/decade, calculate the number of calls per cell site per hour with 2% blocking during system busy hour and an average call holding time of 120 seconds. What is the S/I ratio ?

5. (a) Consider a (3, 1) liner block code where codeword consists of 3 data bits and one parity bit :

   (i) Find all code words in this code:

   (ii) Find the minimum distance of the code

(b) Discuss discrete time baseband equivalent model of an orthogonal frequency division multiplex system.

6. Explain in detail :

(a) Frequency division duplexing

(b) Chip rate processing

(c) Common pilot channel

(d) Synchronization channel

(e) Cell broadcast channel

7. Write short notes on the following :

(a) Channel capacity in Rayleigh fading environment

(b) Multiuser detection for CDMA

8. Assuming the hopping is at the frame rate in a GSM system, compute the hopping rate. What happens to signal quality as the hopping rate is reduced to half or increased by a factor of two ? Can we indefinitely increase the hopping rate in GSM system ?