53 (EC 605) MBCM

2018

MOBILE COMMUNICATION

Paper : EC 605

Full Marks : 100

Time : Three hours

The figures in the margin indicate full marks for the questions.

*Answer **any five** questions.*

1. *(a)* State the advantages of cellular communication over wired communication. 3

   (b) Why hexagonal cellular cell shape is adopted for explanation of cellular communication ? 3

   (c) Show that is a hexagonal cellular system, when the distance between the two co-channel cell is *'D'* and cell radius is *'R'*, then $D/R = \sqrt{3N}$; where *'N'* is cluster size. 5

(d) Describe briefly about different types of multiple access techniques. 9

2. (a) What do you mean by a wireless channel ? Define the following channel parameters : 2+2½×4

(a) Time-delay spread

(b) Coherence time

(c) Coherence bandwidth

(d) Doppler spread.

(b) Determine the sampling interval for a signal when consecutive samples are highly correlated in time. How many samples will be required over $20mt$ travel distance, if the carrier frequency is $900MHz$ and speed of the vehicle is $50m/s$? How long will it take to make these measurements, assuming they could be made in real life for a moving vehicle ? What is the Doppler spread B_D for the channel ? 8

3. (a) Explain in which channel conditions, diversity receiver and equalisers are used. 3

(b) Draw a neat sketch and explain the working principle of LMS equaliser. 10

(c) Describe the differences between : (i) fast fading and slow fading, (ii) time selective fading and (iii) frequency selective fading. 7

4. (a) Why digital modulation techniques are required for transmission of digital signals ? 5

(b) Draw the block diagram of GMSK modulator and a demodulator. Describe the function of each block used. 15

5. (a) What are the drawbacks of AMPS cellular system ? How GSM system solved these issues ? 4

(b) Draw the block diagram of GSM architecture and describe functionalities of all subsystems. 4+12

6. (a) What is maximal length PN sequence ? Mention *one* scheme of generation of a 3-bit PN sequence. 3+5

(b) Describe properties of maximal length sequence. Derive autocorrelation function and power spectral density of a PN sequence. 4+8

7. Write short notes on : ***(any two)*** 2×10

(i) Selection diversity

(ii) CDMA

(iii) Impulse response of time varying channel

(iv) Decision Feedback Equalizer.
