Roll No. ..... Total Pages : 03

BT-8/M-19 38010

WIRELESS AND MOBILE COMMUNICATION

ECE-402E

Time : Three Hours] [Maximum Marks : 100

Note : Attempt *Five* questions in all, selecting at least *one* question from each Section.

Section I

1. (a) Explain the time dispersion and frequency dispersion parameters of a mobile multipath channel. How do you classify mobile channels based on these parameters ? **15**

   (b) What is direct wave path ? **5**

2. (a) For a two-ray model derive the expression for the received power at a distance 'd' from transmitter and show that, $Pr = Pt\ Gt\ Gr\ ht^2\ hr^2/D^4$? **10**

   (b) Find the far-field distance for an antenna with maximum dimension of 1 m and operating frequency of 900 MHz. **10**

Section II

3. (a) Assume four branch diversity is used, where each branch receives an independent Rayleigh fading signal. If the average SNR is 20 dB, determine the probability that the SNR will drop below 10 dB. Compare this with the case of a single receiver without diversity. 12

(b) Explain in detail about optimum receiver structure for non-coherent detection. 8

4. (a) Explain the concept of CDMA. What are its merits and demerits ? 10

(b) Explain the TDMA frame structure and derive the efficiency of a TDMA system. 10

Section III

5. (a) What is Grade of service ? How are Erlang B formula and Erlang C formula used in cellular systems ? 10

(b) A hexagonal cell with four cell system has a radius of 2 km and a total of 50 channels are used in the system. If the load per user is 0.03 Erlangs, and ν = 2 call/hour, compute the following for Erlang C

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system by assuming 5% probability of delay with C = 15 and traffic intensity = 9.0 Erlangs. **10**

(i) How many users per square kilometre this system will support ?

(ii) What is the probability that a call will be delayed for more than 10 secs ?

6. (a) What is the need for frequency reuse ? Explain the frequency reuse concept and show that $N = i^2+ij+j^2$ where N is the number of cells per cluster. **10**

(b) Derive an expression for signal to interference ratio (S/I) for 7 cell cluster system. **10**

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Section IV

7. (a) With suitable block diagram explain the GSM system. **10**

(b) Explain about IS-95 with a neat diagram. **10**

8. Explain briefly the following : **5+5+5+5**

(a) Grade of service (b) FDMA

(c) IMT 2000 (d) Brewster angle.