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P 1156

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2007.

Eighth Semester

Electronics and Communication Engineering

EC 047 — CELLULAR MOBILE COMMUNICATION

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define the term “Roaming” and “Handoff”?
2. Explain briefly Frequency Division Duplexing FDD. Also name a mobile radio standard that uses it.
3. Define one Erlang.
4. How many users can be supported by 10 trunked channels with 0.5% blocking probability. Given the total offered traffic intensity for the above system as 3.96 and assume each user generates 0.1 erlangs of traffic.
5. Draw a graph illustrating the small scale fading and large scale fading.
6. Consider a transmitter which radiates a sinusoidal carrier frequency of 1850 MHz. For a vehicle moving 60mph, compute the received carrier frequency if the mobile is moving directly towards the transmitter.
7. What is ISI? List the techniques used to reduce ISI.
8. Briefly explain the principle behind the Zero forcing equalizer.
9. Explain how microscopic diversity techniques overcome small scale fading.
10. In GSM system 25 MHz is used for forward link, which is broken into radio channels of 200 KHz. If 8 speech channels are supported on a single radio channel, find the number of simultaneous users. Assume no guard band.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Explain with suitable timing diagram, how a cellular telephone call is set up.
(ii) Briefly explain WLL and Paging systems.

Or

- (b) Tabulate the following features for atleast 10 major mobile radio standards. Year of introduction, multiple access technique used, frequency band, modulation and channel bandwidth.
12. (a) (i) Derive an expression for signal to interference ratio for hexagonal cellular architecture in terms of frequency reuse factor. Also calculate the value of reuse factor to achieve an SIR of 30 dB.
(ii) Explain cell splitting and cell sectoring methods of capacity expansion.

Or

- (b) (i) What is frequency Re-use? For $i = 1$ and $j = 2$ draw the cellular system structure depicting the co-channel cells.
(ii) Discuss the handoff strategies used in cellular mobile systems.
13. (a) Define large scale fading. Derive the power received at a distance d in a the 2-ray ground reflection model.

Or

- (b) Find the coherence bandwidth of a mobile radio channel whose local average power delay profile measured at 900 MHz is

$$P(\tau) = \sum_{n=0}^2 \frac{10^{-6}}{n+1} \delta(\tau - n \cdot 10^{-6})$$

Also find whether the signal transmitted at 30 KHz bandwidth and received by a mobile traveling at 30 Km/Hr will undergo fast or slow fading.

14. (a) Explain the salient features of MSK and GMSK modulation techniques.

Or

- (b) (i) Explain the principle of operation of CDMA and derive the equation for the channel capacity in a single cell.
(ii) Explain the rake receiver with suitable block diagram.

15. (a) Using suitable block diagram explain the general architecture of GSM system.

Or

- (b) Explain the salient features of FDMA and TDMA techniques.