

M.Tech. Degree Examination, May/June 2010
Wireless Communication

Time: 3 hrs.

Max. Marks:100

Note: 1. Answer any FIVE full questions.
2. Standard notations are used.

- 1
 - a. Explain the three basic propagation mechanisms in mobile communication. (05 Marks)
 - b. Develop an expression for free space propagation model. (05 Marks)
 - c. Show that the received power a distanced from two ray ground reflection model is given by $P_r = \{P_t G_t G_r h_r h_t / d^2\}$, where the symbols have their usual meaning. Comment as the equation. (10 Marks)

- 2
 - a. A mobile is located 5 km away from a base station and uses a vertical $\lambda/4$ monopole antenna with a gain of 2.55 db to receive cellular video signals. The E field at 1 km from the transmitter is measured to be 10^{-3} v/m. The carrier is MHz.
 - i) Find the length and A_e of the receiving antenna
 - ii) Find the received power at the mobile, using the two-ray ground reflection model. (10 Marks)
 - b. Write a note on :i) Fresnel zone
ii) Lognormal shadowing. (10 Marks)

- 3
 - a. Explain the fading effects due to multipath time delay spread. (06 Marks)
 - b. Explain the impulse response model of a multipath channel. What is the significance of delay bins? (08 Marks)
 - c. Calculate the mean excess delay, rms delay spread and the maximum excess delay(10dB) for the multi path profile given in the Fig. Q3(c). Estimate the 50% coherence band width of the channel. (06 Marks)

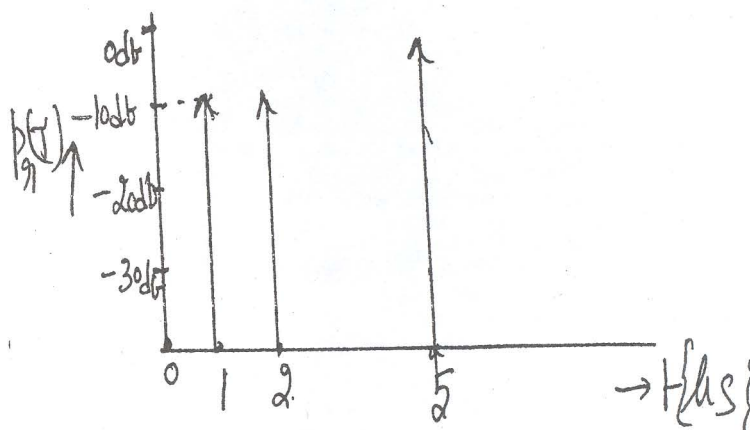


Fig. Q3(c)

- 4
 - a. Explain what is the diversity reception. Explain the performance of RAKE receiver, with a neat diagram. (10 Marks)
 - b. Write notes on : i) Interleavers
ii) Equalizers. (10 Marks)

- 5 a. Explain the frequency reuse concept in cellular mobile systems. (06 Marks)
- b. What are access methods? Explain them briefly. Explain TDMA frame structure, with a neat diagram. (08 Marks)
- c. If a signal to interference noise ratio of 15 db is required for satisfactory forward channel performance of a cellular system, what is the frequency reuse factor? Cluster size that should be used for maximum capacity if the path loss exponent is i) $n = 4$ ii) $n = 3$. Assume that there are 6 co-channel cells in the first tier and all of them are at the same distance from the mobile. Use suitable approximations. (06 Marks)
- 6 a. Define the terms GOS and trunking efficiency. (05 Marks)
- b. If a u.s. AMPS cellular operator is allocated 12.5 MHz for each simplex band and if B_t is 12.5 MHz, B_{guard} is 10 KHz and $B_c = 30$ KHz, find the number of channels available in a FDMA system. (05 Marks)
- c. Explain DS.SS system transmitted receiver using binary phase modulation, with the help of block diagrams. (10 Marks)
- 7 a. Explain the odyssey and iridium satellite programme used in PCS. (10 Marks)
- b. Explain the IS-95 and CDMA.2000 standards, in detail. (10 Marks)
- 8 a. Write a explanatory note on : (08 Marks)
- i) Power control in IS-95 CDMA.
- ii) Various types of interferences in mobile radio, communication and its effects on SNR.
- b. Write the GSM network architecture, with a brief description of different components and different data bases. (12 Marks)