Wireless Communications

Final – Term Examination

Total Marks: 80   **Time Allowed: 4 Hours**

Question No. 1: (2x10)

   a. What are the problems in Wireless Systems?

   b. What are the four basic propagation mechanisms? Briefly explain each of them.

   c. Briefly explain the factors influencing small scale fading?

   d. Discuss Rayleigh and Ricean distribution?

   e. Define Far-field and close in reference point?

   f. Define Coherence Bandwidth, Doppler Spread and Coherence Time? Write down their mathematical expressions?

   g. What are the parameters of Mobile Multipath Channels?

   h. What is the difference between dBm and dBW? Give examples:

   i. How is IRF (Impulse Response Function) of MRC determined?

   j. Define Signal Bandwidth and Symbol Period? What is a relation between them?

Question No. 2: (8+6+6)

   a. A communication system has the following properties:

   P_t= 6 W, G_t= 12 , G_r = 16 , d= 85 km, f= 3.5 GHz.

   Determine the value of Received Power and Path Loss (PL) in dB for Free Space

   b. Define Fresnel Zones? And illustrate it for different knife-edge diffraction scenarios? What is Fresnel Zone Radius?

   c. If the frequency of operation is 550 MHz having a unity antenna gain. Find the effective aperture of an antenna?

Question No. 3: (6+14)

   a. Differentiate between Okumura and Hata Model and write down their mathematical expressions.

   b. Find the median Path Loss in urban area (large city) and suburban area using Hata Model for d= 50 km, h_{te}= 100 m, h_{re}= 10 m. Assume a carrier frequency of 900 MHz.

Question No. 4: (8+6+6)

   a. Calculate the mean excess delay, rms delay for the multipath profile given in the figure below. If the correlation factor is 0.9, find the coherence bandwidth of the channel.
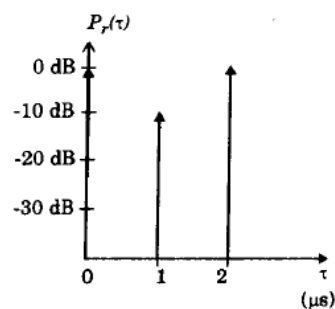
   b. Explain different types of Small Scale fading?

   c. What are the characteristics of Mobile Radio Channel (MRC)? Briefly explain each of them