7E 4046

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B.Tech. VII Semester (Main/Back) Examination - 2014

Electronics & Comm.

7EC3 Wireless Communications

Time : 3 Hours **Maximum Marks : 80**

Min. Passing Marks : 24

Instructions to Candidates:

*Attempt any **five** questions, selecting **one** question from each **unit**. All questions carry **equal** marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.)*

Unit - I

1. a) Describe the models of multipath faded radio signals

   b) What is the delay spread bound τ_{max} of a 220 MHz public land mobile radio (PLMR) system if P_T=1 watt(+30 dBm) and $P_{R\,min}$ = - 90 dBm? How much is τ_{max} if the sensitivity of the receiver is improved to P_{Rmin} = - 100 dBm? Why does increased sensitivity or increased system gain, G_S=P+ $P_{R\,min}$, lead to a higher delay-Spread bound. **(8+8=16)**

OR

1. a) Compare similarities and differences in the fundamental concepts of a direct-sequence spread-spectrum (DS-SS) system versus a frequency hopping spread-spectrum (FH-SS) system.

   b) The data rate (Source or information rate) of DS-CDMA product is f_b=10Kb/s. The spreading rate or chip rate is f_c=10mb/s. How much is the jamming margin Mj if an output $(S/N)_0$ of 12 dB is required for a bit error rate (BER)=10^{-6} performance **(8+8=16)**

Unit - II

2. Determine the transmitter power required in an LOS microwave link operating at FDM mode, with a path length of 60Km and a carrier frequency of 2GHz. The FM receiver's modulation index is 0.5, thee modulation frequency is 5 MHz, and the receiver noise figure is 5dB. The transmitter and receiver antenna diameters are 1m (Parabolic reflectors), and feed losses and branch losses are 5 dB. **(16)**

OR

2. A line of sight microwave link is to be established west of Chicago. The topographic survey of the site indicates a 330m elevation. Additional survey data show physical obstacles along the selected path, with the tallest at 25m. Compute the antenna tower height for a 55- km length and a link operating frequency of 1.8 GHz. **(16)**

Unit - III

3. a) Define briefly the operation of a time-division multiple -access (TDMA) scheme.
   b) A communication satellite system is used exclusively for voice signal transmission, it employ an 8-psk modulation scheme with a spectral efficiency of 3.356 b/8/Hz, corresponding to an error power(P_e) of 10^{-8} while maintaining a C/N equal to 21.5 dB.of earth station transmit with TDMA one burst per frame for a frame period of 2 ms, determine the maximum number of voice channels the transponder bandwidth can accommodate if the total number of guard and preamble bits is 680. **(16)**

OR

3. a) Describe the CDMA systems and what are the advantages and disadvantages of using CDMA for a cellular network.
   b) Calculate the capacity and spectral efficiency of the DS-CDMA system with an omnidirectional cell using the following data : Bandwidth efficiency =0.9, frequency reuse efficiency = 0.45, capacity degradation factor = 0.8, voice activity factor = 0.4, information bit rate = 16.2 kbps, E_b/I_0=7dB, one way system bandwidth = 12.5MHz. Neglect other sources of interferences **(8+8=16)**

Unit - IV

4. a) Describe the operation of mobile IP.
   b) List and briefly define The capabilities provided by mobile IP.
   c) Describe the wireless protocols **(6+5+5=16)**

OR

4. a) What is the difference between a single cell and a multiple-cell wireless LAN?
   b) List and briefly define the IEEE 802 protocol layers.
   c) What error correction schemes are used in Bluetooth baseband **(6+5+5=16)**

Unit - V

5. a) List the main components of an earth station transmitter. With the assistance of a block diagram, briefly explain its function of operation.

   b) With the assistance of a block diagram, describe the function of a satellite earth station down-convertor. **(8+8=16)**

OR

5. a) Define satellite access? Describe the difference between single and multiple access.

   b) In a communication satellite link, the modulation scheme used is QPSK with a spectral efficiency of 1.85 b/s/Hz. Compute the maximum transponder channel capacity, assuming a 36 MHz transponder bandwidth. **(8+8=16)**