7E4046

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B. Tech. VII Semester (Main/Back) Examination, Nov-Dec - 2011
Electronics & Communication Engineering
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) Write the relative advantage of spread-spectrum technique and different modulation scheme for achieve it. (8)

   b) The data rate of a DS-CDMA product is f_b=50 kb/s. The spreading rate is f_c=80 Mb/s . Found the jamming margin for an o/p with $\left(\frac{S}{N}\right)_0 = 12dB$ and BER=10^{-9}. (8)

OR

1. a) Explain the FH-SS with Basic Block diagram and find the expression for processing gain (G_p) in fast and slow systems of this category. (8)

   b) The "near - far interference" is a serious problem in a wireless cellular CDMA N/W, what is the reason for this? (8)

Unit - II

2. a) Draw the design procedure for determine the required power for a radio link design in digital wireless cellular system. Explain the procedure with an example. (8)

b) Define the following for a digital wireless cellular system.

   i) CIR

   ii) Spectral efficiency

   iii) First Fresnel-zone

   iv) Path loss. $(4 \times 2 = 8)$

OR

2. a) Discuss the different outdoor propagation models for wireless cellular system and do their comparative study. (8)

   b) A hexagonal cell within a four-cell system has a radius of 1.387 Km. A total of 60 channels are used within the entire system. If the load per user is 0.029 Erlangs, and $\lambda = 1$ call/hour, compute the following for an Erlang c system that has a 5% probability of a delayed call:

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

      ii) What is the probability that a delayed call will have to wait for more than 10 second?

      iii) What is the probability that a call will be delayed for more than 10 sec? $(2+3+3=8)$

Unit - III

3. a) A cellular system with CDMA system is allocated 880-890 MHz each with channel BW of 1.25 MHz. Estimate the total number of users for a required data rate of 4.9 kb/s and allowed E_b/N_o is 8dB in a single cell model. (8)

   b) Three cellular systems A,B, and C are operating with B_c of 30,25 and 12.5 KHz respectively . If the (C/I) min required for these are 18, 14 and 2dB then compare their capacities. (8)

OR

3. a) Compare FDMA and TDMA in terms of number of channels, efficiency and non-linear effects. $(2 \times 3 = 6)$

   b) If a normal GSM time slot consists of six trailing bits, 8.25 Guard bits, 26 trailing bits and two traffic bursts of 58 bits of data, find the frame efficiency? (6)

c) Write the name of different multiple access techniques based on spread-spectrum principle (4)

Unit - IV

4. a) Draw the architecture of GSM system and explain the functions of following blocks

   i) BSC

   ii) MSC

   iii) HLR and

   iv) BTS (8)

   b) Draw the frame structure of conventional GSM system and show its different time slots (8)

OR

4. a) Draw the signal processing steps from speech input to speech output in GSM system and explain the role of following steps in detail.

   i) Interleaving

   ii) Burst formatting and

   iii) Ciphering (8)

   b) Calculate the following for a standard GSM

   i) Cut-off frequency of the baseband, Gaussian pulse shaping filter used in GSM.

   ii) How many full rate physical channel per cell can a GSM system accommodate? (4+4=8)

Unit - V

5. a) A earth station has G/T ratio of 20.6dB is receiving signal from a satellite at a distance of 36000 km. The satellite has a transmitter power of 60 watts and antenna gain of 30 dBi. Assume losses between the satellite transmitter and its antenna are negligible. The frequency is 10 GHf. Calculate the carrier to noise ratio at the receiver. (8)

b) List the basic steps followed in setup a satellite link and discuss the effects of orbital inclination, coverage angle and slant range in satellite communication.(8)

OR

5. a) Draw the Block diagram of a satellite transmitter and receiver and discuss the use of LNA in it. (3+3+2=8)

   b) A receiving antenna has a gain of 40 dBi with noise temperature of 15 K. The loss between the antenna and LNA input is 0.4 dB, The noise temperature of LNA is 40 K. Calculate its G/T ratio? (8)