

Code No: A6504

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M.Tech I Semester Examinations, March/April-2011

SPREAD SPECTRUM COMMUNICATIONS

(WIRELESS AND MOBILE COMMUNICATIONS)

Time: 3hours

Max. Marks: 60

Answer any five questions

All questions carry equal marks

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1. a) Explain the operation of direct sequence spread spectrum system with suitable block diagram.
b) A direct sequence system has a PN code rate of 192 Mcps and a binary message bit rate of 7500 bps. If QPSK is used instead of bi-phase modulation, what is the propagation gain? Assuming the received signal power is 4×10^{-14} Watts and one sided noise spectral density level is 1.6×10^{-20} W/Hz, find the signal to noise power ratio in the input bandwidth of the receiver. [12]
2. Generate two 31 length m-sequences and find their Auto correlation values, and cross correlation for various time lags. Plot them. [12]
3. a) Give the procedure to generate frequency hopping signals by direct frequency synthesizer. Comment on merits and demerits of the synthesizer when compared to that of indirect method.
b) A direct frequency synthesizer is to be designed with a bandwidth of 48 MHz. Assuming 2 bits are to be used to control spectrum generator and we desire 16 frequencies: (i) find the center frequency and the output frequencies if the spectrum generator only produces frequencies form 72 to 108 MHz. If the minimum switching time is 2.5 μ s, find the maximum hop rate. [12]
4. a) Briefly explain about the effect of non synchronous input signal in spread spectrum system.
b) Discuss about matched filter for PN sequences in DS – CDMA receiver with suitable example. [12]
5. a) Describe the importance of Tan-Dither loop for tracking of PN signal in DS-spread spectrum systems.
b) What is the importance of initial synchronization in CDMA receiver? Explain one technique. [12]
6. With help of quantitative analysis, obtain the expression for output SNR of a spread spectrum system over an AWGN channel. [12]
7. Explain the following:
a) Hybrid ranging systems b) Sources of Ranging error. [12]
8. Write applications of spread spectrum techniques with respect to avionic systems and message protection. [12]

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