

Time: 2 hours

Max. Marks: 75

Answer any five questions
All questions carry equal marks

- 1.a) Explain in detail about generation of PN codes.
- b) With neat block diagram, explain the frequency hopped spread spectrum system model. [7+8]
- 2.a) What is the importance of initial synchronization in CDMA receiver? Explain one technique.
- b) Find a preferred pair of m-sequences having a period of 31 units and evaluate their cross-correlation sequences. [9+6]
- 3.a) Explain the working of Tau-Dither Noncoherent Tracking Loop with a neat block diagram for code tracking.
- b) Consider a spread-spectrum communication system using a noncoherent delay-lock code tracking loop having a noise bandwidth of 1KHz and an IF filter noise bandwidth of 100KHz. Plot the variance of the tracking jitter as a function of loop signal-to-noise ratio for $\Delta=1.0, 0.5$ and 0.1 . [8+7]
- 4.a) With a neat diagram explain the working of Non Coherent delay-lock code tracking loop.
- b) In actual spread-spectrum systems, the squaring device in the energy detectors of the phase discriminators are usually crystal detectors characterized by their sensitivity in units of millivolts of output per milliwatt of input. These devices can be modeled by an ideal squaring device either preceded or followed by an ideal amplifier. Calculate the gain of the amplifier in both cases as a function of the detector sensitivity K . [8+7]
- 5.a) Explain how a signal will be detected in Additive white Gaussian Noise using Multiple Dwell detection method.
- b) Develop a detailed procedure for calculating P_d and P_{fa} as a function of received SNR, frequency offset and filter integration time for a matched filter synchronizer. Assume BPSK direct-sequence spread-spectrum modulation. [8+7]
- 6.a) With necessary equations derive the output of Direct Sequence spread spectrum receiver using matched filter code acquisition.
- b) Plot the probability density function of the output of a linear envelope detector with a sinusoid plus additive white Gaussian noise input for signal-to-noise ratios of -20, 0, 3 and 6 dB. [8+7]
- 7.a) Explain how IS-95 system replaces the existing analog cellular radio channels with a single DS-SS carrier.
- b) Explain the working of Linear suboptimal detectors used for multiuser detection. [7+8]
- 8.a) Explain the performance of a coherent direct sequence spread spectrum system in barrage noise jamming.
- b) Discuss the performance of coherent direct sequence spread spectrum systems in partial band jamming. [8+7]