Libiaty L

18ECS14

t Semester M.Tech. Degree Examination, Dec.2019/Jan.2020
Advanced Communication Systems – I

Max. Marks: 100

Note: Answer FIVE full questions, choosing ONE full question from each module.

Module-1

- a. Assume that m(t) is a real baseband signal with bandwidth 'w', and $x(t) = m(t) \cos(2\pi f_0 t)$ and $y(t) = m(t) \sin(2\pi f_0 t)$, where, $f_0 > w$. Show that x(t) and y(t) are orthogonal but their low-pass equivalent are not orthogonal. (06 Marks)
 - b. With the aid of relevant spectra and equations illustrate the low-pass equivalent representation of band-pass signals. (08 Marks)
 - c. Explain continuous phase frequency shift keying with relevant equations. (06 Marks)

OR

- 2 a. Explain offset QPSK with the aid of relevant equations, phase transition and in-phase and quadrature phase of the bit sequence. (10 Marks)
 - b. List the memoryless modulation methods. Explain PAM with the aid of constellation and equations.

 (10 Marks)

Module-2

- 3 a. Explain the structure of a matched filter receiver with N correlators. (10 Marks)
 - b. Derive error probability for PSK signaling. (10 Marks)

OR

- 4 a. Write the block diagram of DPSK receiver. Comment on the performance of binary DPSK.
 - b. Derive error probability of PAM signaling. (08 Marks) (06 Marks)
 - c. State and explain the dimensionality theorem. (06 Marks)

Module-3

- 5 a. What are the impairments that the signals transmitted through telephone channels are subjected to? Explain them briefly. (06 Marks)
 - b. The binary sequence 1 1 1 0 1 0 0 1 0 0 0 1 1 0 1 is input to a precoder whose output is used to modulate a duobinary transmitting filter. Construct a table showing the precoded sequence, the transmitted sequence, received sequence and the decoded sequence. (06 Marks)
 - c. Explain optimum maximum likelihood receiver for an AWGN channel with ISI. (08 Marks)

OR

- 6 a. What is an whitened matched filter? With the aid of a diagram, explain equivalent discrete time model of channel with ISI. (10 Marks)
 - b. What is peak distortion criterion? Explain the block diagram of channel with equivalent zero-forcing equalizer. (10 Marks)

7 a. Explain predictive decision –feedback equalizer with the aid of a diagram and relevant equations.

b. Explain adaptive equalization based on decisions from viterbi decoder.

c. Write a note on convergence properties of LMS algorithm.

(06 Marks)

(06 Marks)

OR

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a. Explain adaptive zero forcing algorithm with the aid of block diagram. (10 Marks)
b. With the aid of relevant equations and block diagram, explain LMS algorithm which minimizes the MSE. (10 Marks)

Module-5

a. List some applications of direct sequence spread spectrum signals. Also explain transmission of low-detectability signal and digital cellular CDMA system based on DS spread spectrum.
 (10 Marks)

b. What are the two phases in time synchronization of the receiver to the received spread spectrum signal? Explain delay locked loop for PN code tracking. (10 Marks)

OR

a. Explain the model of spread spectrum digital communication system.
b. Explain gold sequence in terms of generation, and auto-correlation function.
c. With the aid of a block diagram explain time-hopping spread spectrum system.
(06 Marks)
(07 Marks)
(07 Marks)