

CBCS SCHEME

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15EC61

Sixth Semester B.E. Degree Examination, June/July 2023 Digital Communication

Time: 3 hrs.

Max. Marks: 80

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

Module-1

- What is Hilbert transform? Briefly explain the important properties of Hilbert transform. (04 Marks)
 - With the help necessary equations and block diagram explain the canonical representation of Band – pass signals. (08 Marks)
 - Write a short notes on B3ZS signaling. (04 Marks)

OR

- For the binary data {0, 1, 1, 0, 1, 0, 0, 1}, draw the polar NRZ unipolar RZ signaling waveforms. (04 Marks)
 - Derive the expression for the complex low pass representation of band pass systems. (08 Marks)
 - Define pre-envelope of a real valued signal. Given a band pass signal $s(t)$, sketch the amplitude spectra of signal $s(t)$, pre-envelope and complex envelope. (04 Marks)

Module-2

- Derive the expressions for mean and variance of the correlator outputs. Also show that the correlator outputs are statistically independent. (07 Marks)
 - For the signals $S_1(t)$, $S_2(t)$, $S_3(t)$ and $S_4(t)$ shown in Fig.3(b), determine a set of orthonormal basis functions using Gram – Schmidt orthogonalization procedure.

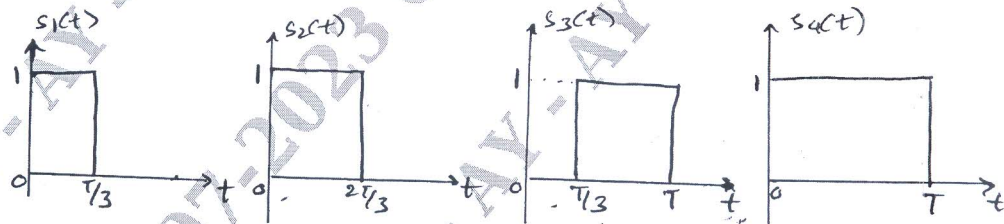


Fig.Q3(b)

(09 Marks)

OR

- Explain the correlation receiver and matched filter receiver. (07 Marks)
 - Write a short notes on :
 - Geometric representation on signals
 - Optimum receivers using coherent detection
 - ML decoding.(09 Marks)

Module-3

- What is BPSK? Derive the expression for the probability of error for the BPSK. (06 Marks)
 - For the binary sequence [0, 1, 1, 0, 1, 0, 0, 0], draw the QPSK waveform. (04 Marks)
 - With a neat diagram and expressions, explain the BFSK generation and non-coherent detection method. (06 Marks)

OR

- 6 a. Explain the generation and optimum detection of DPSK. (06 Marks)
b. Explain the M-ary QAM system. (04 Marks)
c. With a neat diagram, explain the generation and coherent detection of QPSK signals. (06 Marks)

Module-4

- 7 a. With a neat block diagram, explain the digital PAM transmission through band limited baseband channels. Also derive the expression for ISI. (06 Marks)
b. With relevant equations and diagram, explain the following terms :
i) Duo binary signal pulse
ii) Modified Duo-binary signal pulse
iii) Partial response signals
iv) Raised cosine spectrum. (10 Marks)

OR

- 8 a. What is ZFE? With a neat block diagram, explain the operation of linear transversal filter. (06 Marks)
b. Write short notes on :
i) Symbol – by – symbol detection of data with controlled ISI
ii) Eye diagram
iii) Adaptive equalizers. (10 Marks)

Module-5

- 9 a. Explain the model of a spread spectrum digital communication system. (06 Marks)
b. With a neat block diagram, explain the frequency hopped spread spectrum. (06 Marks)
c. Explain the effect of de-spreading on a narrow band interference. (04 Marks)

OR

- 10 a. Explain the generation and demodulation of DS spread spectrum signal. (06 Marks)
b. With a neat block diagram, explain the operation of CDMA based on IS – 95. (06 Marks)
c. Explain the low-delectability signal transmission and wireless LANS applications of DSSS. (04 Marks)
