CBCS SCHEME

USN | | | | | | | | | | |

18EC61

Sixth Semester B.E. Degree Examination, June/July 2024
Digital Communication

Time: 3 hrs. Max. Marks: 100

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

Module-1

1 a. Define Hilbert transform, list the properties and applications of Hilbert transform. **(06 Marks)**

b. Define pre-envelope of real valued signal. Given a band pass signal statement, sketch the amplitude spectra of signal statement, pre-envelope statement and complex envelope $\tilde{s}(t)$. **(06 Marks)**

c. Explain the time domain procedure for complex presentation of bandpass signals and system. **(08 Marks)**

OR

2 a. Obtain the canonical representation of band pass signals. **(07 Marks)**

b. What is line coding? For the binary stream 0110011 sketch the following line codes :
i) unipolar NRz
ii) polar MRz
iii) unipolar Rz
iv) bipolar Rz
v) Manchester. **(06 Marks)**

c. Derive the expression for complex low pass representation of band pass systems. **(07 Marks)**

Module-2

3 a. Explain the geometric representation of signals. Show that energy of signal is equal to the squared length of the vector representing it. **(07 Marks)**

b. Explain with a neat diagram and necessary equations the matched filter receiver. **(07 Marks)**

c. Explain the operation of correlation receiver with relevant diagrams. **(06 Marks)**

OR

4 a. Derive the expression for mean and variance of the correlator outputs. Also show that the correlator outputs are statistically independent. **(10 Marks)**

b. i) Using the Gram-Schemidt orthogonalization procedure, find a set of orthogonal basis functions to represent the three signals $S_1(t)$, $S_2(t)$ and $S_3(t)$ as shown in Fig.Q4(b)(i)
ii) Express each of these signals in terms of set of basis functions found on part(i).

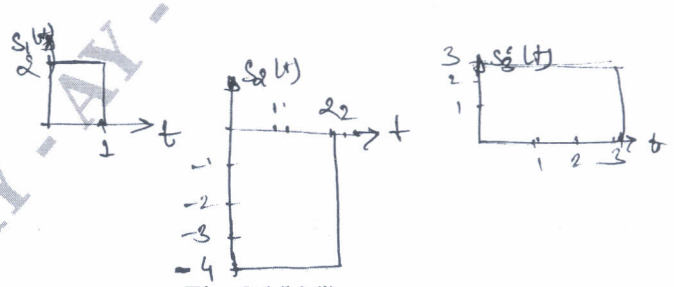

Fig.Q4(b)(i) **(10 Marks)**

Module-3

5 a. Explain BPSK system with the help of transmitter and receiver. Also derive the expression for probability of error of binary PSK. **(10 Marks)**

b. Explain with a neat block diagram generation and detection QPSK signals. **(06 Marks)**

c. Draw the signal-space diagram of M-ary QAM for M = 16. **(04 Marks)**

OR

6 a. Explain binary FSK. With a neat block diagram, describe a scheme for generating FSK signals. **(10 Marks)**

b. Explain with a neat diagram, generation and detection of DPSK signal. **(10 Marks)**

Module-4

7 a. What is ISI? Obtain the expression of output of a filter with inter-symbol interference. **(08 Marks)**

b. What are adaptive equilizers? Explain linear adaptive equalizer based on MSE criterion. **(08 Marks)**

c. Write a note on eye diagram. **(04 Marks)**

OR

8 a. Explain the design of band limited signals with controlled ISI. **(10 Marks)**

b. With a neat diagram, explain the concept of linear traversal filter. **(06 Marks)**

c. For the binary data sequence $\{d_n\}$ given as 111010010001101 determine the precoded sequence $\{i_n\}$, the transmitted sequence $\{a_n\}$, the received sequence $\{b_n\}$ and decoded sequence $\{d_n\}$. **(04 Marks)**

Module-5

9 a. Explain the generation and demodulation of DS spread spectrum signal. **(08 Marks)**

b. Explain with a neat block diagram, FH spread spectrum system. **(06 Marks)**

c. Mention the applications of DSSS and explain any one in detail. **(06 Marks)**

OR

10 a. With a neat diagram, explain the generation of PN sequence and state properties of ML sequences. **(08 Marks)**

b. Explain with a neat block diagram IS = 95 forward link. **(07 Marks)**

c. Explain the effect of dispreading on narrow band interference in DSSS system. **(05 Marks)**

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