CBCS SCHEME

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

15EC61

Sixth Semester B.E. Degree Examination, Feb./Mar. 2022
Digital Communication

Time: 3 hrs. Max. Marks: 80

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

Module-1

1 a. What is Hilbert transform? Explain the properties of Hilbert transform. **(08 Marks)**

b. Explain complex envelops of bandpass signals. **(08 Marks)**

OR

2 a. Given the binary sequence 10011011. Draw the following line codes.
i) Unipolar NRZ and unipolar RZ
ii) Polar NRZ and polar RZ
iii) Bipolar NRZ and bipolar RZ
iv) Manchester format. **(07 Marks)**

b. Write a short note on BNZS. **(05 Marks)**

c. What is pre envelop? Explain. **(04 Marks)**

Module-2

3 a. Explain the geometric representation of signals. **(08 Marks)**

b. Explain the Gram-Schmidt orthogonalisation procedure. **(08 Marks)**

OR

4 a. Three signals $S_1(t)$, $S_{2(t)}$ and $S_3(t)$ are as shown below. Apply Gram-Schmidt procedure to obtain an orthonormal basis for the signal. Express the signals $S_1(t)$, $S_2(t)$ and $S_3(t)$ in terms of orthonormal basis function.

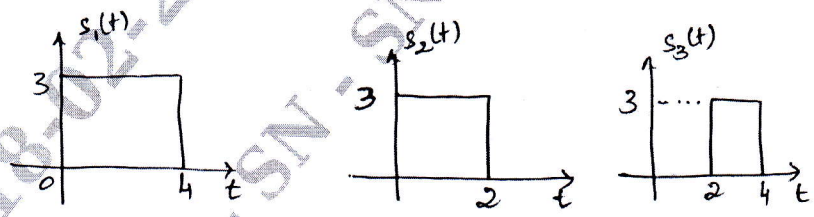

Fig.Q4(a) **(06 Marks)**

b. What is a matched filter? Explain its properties. **(06 Marks)**

c. Explain correlation receiver in brief. **(04 Marks)**

Module-3

5 a. Explain BPSK system with the help of transmitter and receiver. **(08 Marks)**

b. Draw the block diagram of DPSK transmitter and explain for the binary sequence 11001000110, find the resulting waveform for DPSK system. **(08 Marks)**

OR

6 a. Obtain an expression for probability of symbol error for coherent binary FSK. **(07 Marks)**

b. Compare MSK and QPSK. What is the bandwidth requirement of MSK? **(05 Marks)**

c. An FSK system transmits binary data a the rate of 2×10^6 bits per second. During the course of transmission, AWGN of zero mean and two sided power spectral density 10^{-20} watts per hertz is added to the signal. The amplitude of the received sinusoidal wave for digit 0 or 1 is 1 microvolt. Find the average probability of symbol error assuming non-coherent detection. **(04 Marks)**

Module-4

7 a. What is Inter Symbol Interference (ISI)? How it arises? **(06 Marks)**

b. Explain the need for a pre coder in a duo binary signaling. For input binary data 1011101, obtain the o/p of pre coder and output of duo binary coder. **(06 Marks)**

c. Explain modified duo binary encoding with pre coder. **(04 Marks)**

OR

8 a. Explain the block diagram of zero forcing equalizer. **(08 Marks)**

b. Explain adaptive equalizer. **(08 Marks)**

Module-5

9 a. What is PN – sequence? Explain the properties of PN – sequence. **(08 Marks)**

b. With the help of block diagram, explain direct sequence spread spectrum system. **(08 Marks)**

OR

10 a. A spread spectrum communication system has the following parameters :
Information bit duration = $T_5 = 4$ millisecs
PN chip duration = $T_C = 2$ micro secs. Find the bit rate of the binary data, PN – sequence length, band width of the PN sequence and processing gain of the system. **(04 Marks)**

b. Explain with neat block diagram, the working of frequency hop spread spectrum transmitter and receiver system. **(08 Marks)**

c. List the applications of spread spectrum modulation. **(04 Marks)**

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