CBCS SCHEME

15EC61

Sixth Semester B.E. Degree Examination, Dec.2019/Jan.2020
Digital Communication

Time: 3 hrs.

Max. Marks: 80

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

Module-1

1   a.   Define Hilbert transform. State the properties of it. **(04 Marks)**
    b.   Obtain the Hilbert transform of
         i) $x(t) = (\cos 2\pi Ft + \sin 2\pi Ft)$
         ii) $x(t) = c^{-j2\pi Ft}$ **(04 Marks)**
    c.   Explain canonical representation of band pass signal. **(08 Marks)**

OR

2   a.   Derive the expression for the complex low pass representation of bandpass systems.
          (08 Marks)
    b.   For the given data stream 11011100. Sketch the line code
         i)   Unipolar NRZ
         ii)   Polar NRZ
         iii) Unipolar RZ
         iv)   Bipolar NRZ **(04 Marks)**
    c.   Draw the power spectra of NRZ unipolar and NRZ polar format. **(04 Marks)**

Module-2

3   a.   Show that the energy of a signal is equal to squared length of the signal vector. **(08 Marks)**
    b.   Obtain the decision rule for maximum likelihood decoding and explain the correlation receiver. **(08 Marks)**

OR

4   a.   Explain the correlation receiver using product integrator and matched filter. **(08 Marks)**
    b.   Three signals $s_1(t)$, $s_2(t)$ and $s_3(t)$ are shown in Fig.Q.4(b). Apply Gram Schmidt procedure to obtain an orthonormal basis for the signals. Express signals $s_1(t)$, $s_2(t)$ and $s_3(t)$ in terms of orthonormal basis functions. **(08 Marks)**
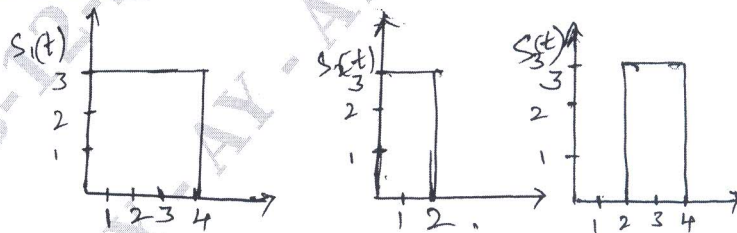

Fig.Q.4(b)

Module-3

5   a.   With necessary diagrams, explain the generation and reception of BPSK signal. **(10 Marks)**
    b.   Given the binary data 10010011, draw the BPSK and DPSK waveforms. **(06 Marks)**

OR

6 a. Derive the expression for error probability of BFSK. **(08 Marks)**
   b. With block diagram explain generation and detection of DPSK. **(08 Marks)**

Module-4

7 a. What is ISI? Obtain the expression of output of a filter with intersymbol interference. **(08 Marks)**
   b. Explain the Nyquist criterion for distortionless baseband binary transmission and obtain the ideal solution for zero ISI. **(08 Marks)**

OR

8 a. Draw and explain the time-domain and frequency domain of duobinary and modified duobinary signal. **(08 Marks)**
   b. What is channel equalization? With a neat diagram, explain the concept of equalization using a linear transversal filter. **(08 Marks)**

Module-5

9 a. Draw the 4 stage linear feedback shift register with 1st and 4th state is connected to Modulo-2 adder. Output of Modulo-2 is connected to 1st stage input. Find the output PN sequence and write the autocorrelation function with initial state 1000. **(06 Marks)**
   b. Explain the generation of direct sequence spread spectrum with relevant waveforms and spectrums. **(07 Marks)**
   c. Write a short note on application of spread spectrum in wireless LAN's. **(03 Marks)**

OR

10 a. With necessary block diagram, explain the transmitter and receiver of frequency hop spread spectrum. **(08 Marks)**
   b. With a neat block diagram, explain the CDMA system based on IS-95. **(08 Marks)**

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