CBCS SCHEME

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

17EC61

Sixth Semester B.E. Degree Examination, July/August 2022
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. What are its application? Prove that a signal g(t) and its Hilbert transform $\hat{g}(t)$ are orthogonal over the entire time interval $(-\infty, \infty)$. **(08 Marks)**

b. Explain Canonical Representation of band pass signal. **(06 Marks)**

c. Derive the expression for the complex low pass representation of band pass systems. **(06 Marks)**

OR

2 a. Draw the power spectral density and NRZ polar format. For the given data stream 11011100. Sketch the line code.
(i) Unipolar NRZ.
(ii) Polar NRZ.
(iii) Bipolar NRZ **(06 Marks)**

b. What are the advantages of HDB3 code over conventional alternate mark inversion (AMI) code. Code the pattern "1010000011000011000000 using HDB3 encoding and AMI encoding. **(08 Marks)**

c. Explain B3ZS and B6ZS. **(06 Marks)**

Module-2

3 a. Explain the geometric representation of signals. What is a signal vector? What is a signal space diagram? **(10 Marks)**

b. Explain Gram-Schmidt orthogonalization procedure to obtain a set of orthonormal basis functions from the given set of signals. **(10 Marks)**

OR

4 a. Explain the function of convolution receiver. **(08 Marks)**

b. Explain matched filter receiver. **(06 Marks)**

c. Find the output of the filter matched to x(t) as given below, when x(t) is input to the filter. **(06 Marks)**

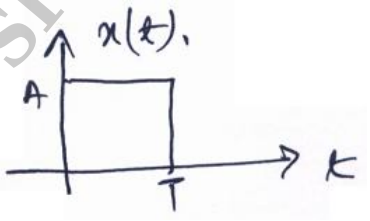

Fig. Q4 (c)

Module-3

5 a. Describe the working of,
(i) Coherent BPSK transmitter.
(ii) QPSK transmitter. **(10 Marks)**

b. Write short notes on:
(i) M-ary PSK.
(ii) M-ary QAM. **(10 Marks)**

OR

6 a. With neat diagram and expression, explain binary FSK generation and non-coherent detection scheme. **(10 Marks)**

b. Describe the generation and optimum detection of differential phase shift keying with neat block diagram. **(10 Marks)**

Module-4

7 a. Explain the following terms with related equations and diagram with respect to base band transmission:
(i) ISI and Nyquist condition for zero ISI.
(ii) Duo binary signal pulse.
(iii) Modified duo-binary signal pulse.
(iv) Partial response signal.
(v) Raised cosine spectrum. **(10 Marks)**

b. With a neat block diagram, explain the digital PAM transmission through band limited baseband channels. Also obtain expression for inter symbol interference. **(10 Marks)**

OR

8 a. With neat diagram and relevant expression, explain the concept of adaptive equalization. **(10 Marks)**

b. For the binary data sequence {o/n} given by [111010010001101]. Determine the precoded sequence, transmitted sequence, received sequence and decoded sequence. **(10 Marks)**

Module-5

9 a. Explain with neat block diagram of demodulation of Direct sequence spread spectrum systems. **(06 Marks)**

b. Explain with block diagram frequency Hopped spread spectrum technique. **(08 Marks)**

c. A DSSS system so that the power ratio P_0/P_N at the intended receiver is 10^{-2}. If the desired E_b/N_O is 10. For acceptable performance, determine the minimum value of the processing gain. Also find probability of error. **(06 Marks)**

OR

10 a. Write short note on spread spectrum to wireless CAN. **(06 Marks)**

b. With a neat diagram, explain the IS-95 Forward link. **(08 Marks)**

c. Write a note on code division multiple access as an application of direct sequence spread spectrum. **(06 Marks)**

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