

CBCS SCHEME

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18EC61

Sixth Semester B.E. Degree Examination, Dec.2023/Jan.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 HT. State and prove the properties. Mention its applications. (10 Marks)
- b. Define signaling format. Sketch the following format using data stream as 111000110:
(i) Unipolar RZ (ii) Unipolar NRZ (iii) Polar NRZ
(iv) AMI (v) Manchester NRZ (06 Marks)
- c. Describe the overview of HDB3 format. (04 Marks)

OR

- 2 a. Explain the pre-envelope of a band pass signals. (07 Marks)
- b. Explain complex low pass representation of band pass systems. (07 Marks)
- c. Explain canonical representation of band pass signals. (06 Marks)

Module-2

- 3 a. Explain the Gram-Schmidt orthogonalization procedure. (08 Marks)
- b. Explain the geometric representation of signals and express the energy of signal in terms of the signal vector. (12 Marks)

OR

- 4 a. Explain the matched filter receiver with neat sketches and mathematical equations. (08 Marks)
- b. Explain conversion of continuous AWGN channel into a vector channel. (07 Marks)
- c. Describe the complex envelope of a band pass signal. (05 Marks)

Module-3

- 5 a. Define PSK. Derive the probability of error of BPSK. (10 Marks)
- b. Describe the QPSK signal with signal space diagram. With a neat diagram, explain the generation and detection of QPSK signal. (10 Marks)

OR

- 6 a. Obtain the expression for probability of symbol error of coherent FSK. (10 Marks)
- b. Sketch the waveform of QPSK using 1100100001. (05 Marks)
- c. Illustrate the operation of DPSK for the binary sequence 10010011. (05 Marks)

Module-4

- 7 a. With a neat diagram, explain the digital PAM transmission through band limited channels. (08 Marks)
- b. Explain signal design for band limited signals with controlled ISI (partial response signals). (12 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and/or equations written eg. 42+8 = 50, will be treated as malpractice.

OR

- 8 a. With a suitable diagram, explain adaptive equalizing filter. (10 Marks)
b. Describe signal design for band limited channels with zero ISI. (10 Marks)

Module-5

- 9 a. With a neat sketch, explain direct sequence spread spectrum. (10 Marks)
b. Briefly explain the four applications of DS spread spectrum signals. (10 Marks)

OR

- 10 a. With a suitable diagram, explain forward and reverse link of CDMA based IS-95. (12 Marks)
b. A DSSS signal is designed so that the power ratio P_R/P_N at the intended receiver is 10^{-2} . If the desired $E_b/N_0 = 10$ for acceptable performance, determine the minimum value of its processing gain. (03 Marks)
c. Illustrate slow frequency hopping. (05 Marks)
