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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Fourth Semester B.Tech (Minor) Degree Examination June 2022 (2020 Admission)

Course Code: ECT284

Course Name: DIGITAL COMMUNICATION

Max. Marks: 100

Duration: 3 Hours

PART A

(Answer all questions; each question carries 3 marks)

Marks

- 1 List the advantages of digital communication system over analog communication system. (3)
- 2 What is the significance of source encoding in digital communication system? (3)
- 3 Why do we prefer adaptive delta modulation instead of delta modulation? (3)
- 4 Explain the term quantization noise. (3)
- 5 Given the data stream 1110010100, sketch the transmitted sequence of pulses for each of the following line codes: (3)
 - 1) Unipolar nonreturn-to-zero
 - 2) Polar nonreturn-to-zero
- 6 What are the characteristics of signaling codes? (3)
- 7 Draw the signal space diagram of QAM signal for $M=8$. (3)
- 8 Explain BER-SNR curve of QPSK system. (3)
- 9 Define channel capacity. (3)
- 10 List two properties of cyclic codes. (3)

PART B

(Answer one full question from each module, each question carries 14 marks)

Module -1

- 11 a) State sampling theorem and explain the significance of Nyquist rate. (8)
b) Prove that sampled signal can be reconstructed by passing the samples through a low pass filter. (6)
- 12 a) Draw the block diagram of a linear PCM system and explain the blocks. (8)
b) Explain how compander achieves non uniform quantization. What are the various compression laws used for this application? (6)



Module -2

- 13 a) With the help of suitable block diagrams explain differential pulse code modulation. How does it differ from PCM and delta modulation? (10)
- b) Explain the distortions associated with delta modulation. (4)
- 14 a) With the help of suitable block diagrams explain adaptive delta modulation. (10)
- b) Prove the necessary condition to be satisfied by a delta modulator to avoid slope overload distortion if the input is a sine wave of frequency f_m and amplitude A_m . (4)

Module -3

- 15 a) Explain the principle of Manchester coding. Code the binary pattern {011000011} using Manchester coding. (8)
- b) Explain the principle of alternate mark inversion coding with suitable example. (6)
- 16 a) Explain T carrier systems with proper block diagram. (6)
- b) Explain the B3ZS line coding scheme. Determine the B3ZS line code for the following data sequence: 101000110000000010001. (8)

Module -4

- 17 a) Explain the generation and detection of BPSK signals with the help of block diagrams. Draw the BER-SNR curve. (8)
- b) Explain QAM modulation with neat block diagram. (6)
- 18 a) Draw the constellation diagram for QPSK modulation and explain the generation and detection of QPSK signals with the help of block diagrams. (10)
- b) Explain the need for digital modulation in modern communication. (4)

Module -5

- 19 a) The parity matrix of a (6,3) linear systematic block code is given below. (8)

$$P = \begin{bmatrix} 0 & 1 & 1 \\ 1 & 0 & 1 \\ 1 & 1 & 0 \end{bmatrix}$$

Find all the possible code vectors and draw the encoder diagram.

- b) Explain in detail, the principle of correlation receiver. (6)
- 20 a) Explain cyclic codes and channel encoding with cyclic codes. (6)
- b) Explain how matched filter is used in digital reception. (8)
