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Question Paper Code : 52916

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2019.

Fifth Semester

Electronics and Communication Engineering

EC 6501 — DIGITAL COMMUNICATION

(Regulation 2013)

(Also common to : PTEC 6501 — Digital Communication for B.E. (Part-Time) – Fourth Semester – Electronics and Communication Engineering – Regulation 2014)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. State sampling theorem.

2. What is meant by aliasing effect?

3. What is a linear predictor? On what basis are the predictor coefficients determined?

4. List few digital modulation schemes used for voice communication.

5. For the binary data 0110100, draw Manchester coded signal.

6. What is meant by ISI in communication system? How can it be minimized?

7. Distinguish between coherent and non-coherent reception.

8. What is QPSK? Write the expression for the QPSK signal.

9. What is a linear code?

10. What is meant by constraint length of a convolution code?

PART B — (5 × 13 = 65 marks)

11. (a) Illustrate and describe the types of quantizer? Describe the midtrend and midrise type characteristics of uniform quantizer with a suitable diagram, and derive equation for quantization noise power. (2 + 5 + 6)

Or

(b) Discuss the logarithmic companding of speech signal in detail and comment also on A-law and μ-law.

12. (a) Describe the delta modulation system in detail with a neat block diagram. Also, illustrate the two forms of quantization error in delta modulation.

Or

(b) Describe the Adaptive Delta Modulation with neat sketch and compare it with Delta Modulation of ADPCM.

13. (a) Derive and plot the power spectra of NRZ unipolar and bipolar format signals.

Or

(b) Discuss the principle of obtaining Eye pattern and mark important observations made from the eye patterns.

14. (a) Describe the operation of modulation and demodulation of binary FSK signals.

Or

(b) Describe the operation of ASK modulation and coherent ASK demodulation in detail.

15. (a) Consider the (7, 4) linear block code whose generated matrix is given below. (4 + 5 + 4)

$$G = \left[\begin{array}{cccc:ccc} 1 & 0 & 0 & 0 & 1 & 1 & 1 \\ 0 & 1 & 0 & 0 & 1 & 1 & 0 \\ 0 & 0 & 1 & 0 & 1 & 0 & 1 \\ 0 & 0 & 0 & 1 & 0 & 1 & 1 \end{array}\right]$$

(i) Find all the code vectors.

(ii) Find Parity check matrix (H).

(iii) Find the minimum weight of the code.

Or

(b) With suitable numerical examples, describe the cyclic codes with the linear and cyclic property and also represent the cyclic property of a code word in polynomial notation.

PART C — (1 × 15 = 15 marks)

16. (a) (i) Illustrate the transmitter, receiver and signal space diagram of Quadrature phase shift keying.

(ii) Derive probability of symbol error with neat sketch and calculate the same when Eb/No equals 2 units.

Or

(b) Consider a linear block code with generator matrix.

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

(i) Determine the parity check matrix. (2)

(ii) Determine the error detecting and capability of the code. (3)

(iii) Draw the encoder and syndrome calculation circuits. (6)

(iv) Calculate the syndrome for the received vector $r = [1\,1\,0\,1\,010]$ and identify the error corrected vector. (4)
