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Question Paper Code : 31225

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2012.

Sixth Semester

Electronics and Communication Engineering

EC 1351 A — DIGITAL COMMUNICATION TECHNIQUES

(Regulation 2008)

Time : Three hours   Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is Pulse Amplitude Modulation?

2. What is the main difference between DPCM and DM?

3. State Nyquist pulse shape criterion.

4. What is meant by correlative coding?

5. What is the bandwidth efficiency for QPSK modulation scheme if $E_b/N_o = 11.2$ dB?

6. What is the advantage of BPSK over BFSK?

7. Define discrete memoryless channel.

8. What is linear block code?

9. What is meant by direct sequence?

10. Define processing gain and jamming margin.

PART B — (5 × 16 = 80 marks)

11. (a) (i) What is meant by sampling? Explain flat sampling process with neat diagram. (5)

    (ii) What is meant by companding? Explain μ -law companding. (5)

    (iii) Draw the block diagram of adaptive delta modulation systems and explain each block in detail. (6)

Or

    (b) (i) Draw the block diagram of PCM system and explain the function of each block. (10)

    (ii) A PCM system uses a uniform quantizer followed by a 7 bit binary encoder. Determine the output SNRq when a sinusoidal modulating wave of frequency 1MHz is applied to its input. (6)

12. (a) (i) State and prove any two properties of matched filter. (5)

    (ii) Draw the block diagram of binary base-band pulse transmission system and explain. (7)

    (iii) Explain eye pattern with neat diagram. (4)

Or

    (b) (i) With neat block diagram explain modified duobinary signaling scheme without and with precoder. (8)

    (ii) Draw the block diagram of adaptive equalization and explain in detail. (8)

13. (a) Explain with block diagram the coherent binary FSK transmitter and receiver. Also derive its probability of error.

Or

    (b) Draw the block diagram of coherent QPSK modulation technique and explain with signal space diagram. Derive its probability of error.

14. (a) (i) Consider a linear block code with generator matrix in systematic form as (2 + 2 + 4 + 2)

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

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(1) Determine the parity check matrix in systematic form.

(2) Determine the minimum distance of the code.

(3) Draw the encoder and syndrome calculation circuits.

(4) Calculate the syndrome for the received vector $r = [1\ 1\ 0\ 0\ 0\ 1\ 1]$.

(ii) Explain Viterbi decoding algorithm for convolution code. (6)

Or

(b) (i) The generator polynomial of a (7, 4) cyclic code is $g(X) = 1 + X + X^3$

(1) Find parity check polynomial

(2) Find the generator and parity check matrix in systematic form.

(3) Draw the encoder and syndrome computation circuit.

$(2 + 6 + 4)$

(ii) What is trellis coded modulation? Explain. (4)

15. (a) (i) Draw the block diagram of direct sequence spread spectrum technique with coherent BPSK and explain. (10)

(ii) Explain why a maximal length L-stage linear feedback shift register can produce a PN sequence with a period not greater than $2^L - 1$. (6)

Or

(b) Explain frequency hopped spread spectrum system with neat block diagram and also explain how several symbols are transmitted on each frequency hop?

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