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Question Paper Code : 11270

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2014.

Sixth Semester

Electronics and Communication Engineering

080290039 — DIGITAL COMMUNICATION

(Regulation 2008)

Time : Three hours Maximum : 100 marks

(Codes/Tables/Charts to be permitted, if any, may be indicated)

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. State Sampling Theorem.
2. What is Quanlization error?
3. What is Intersymbol Interference?
4. What are Eye patterns?
5. Distinguish between detector and demodulator.
6. Define Bandwidth efficiency.
7. Define Hamming code.
8. What are Turbo codes?
9. Determine the processing gain of a spread spectrum communication system, if the information bit duration is 90msec and PN chip duration is 0.75nsec.
10. State the Correlation property of maximal length PN sequence.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Explain in detail about Delta modulation transmitter and receiver.

(ii) A sinusoidal signal. $X(t) = \alpha_0 . \cos(2\pi f_0 t)$ is applied to a delta modulator that operates with a sampling Period, T_s and step size, $\Delta = 2\delta$.

(1) Find the expression for amplitude, a_0 to avoid slope overload distortion.

(2) Compute the maximum permissible value of the output signal power.

(3) Compute the variation of Quantization noise in delta modulation. Find the maximum value of output signal to noise ratio. (6 + 10 = 16)

Or

(b) Derive Quantization noise and signal to Quantization noise ratio in PCM. (16)

12. (a) The binary data 11010011001110 are applied to a input of a duo binary system

(i) Construct duo-binary coded output at the receiver without precoder,

(ii) The level at receiver input produced by the third digit is chanued due to noise. Construct a new receiver output.

(iii) Repeat (i) and (ii) assuming the use of precoder in the transmitter. (4 + 4 + 8 = 16)

Or

(b) Determine the Nyquist criterion for distortionless baseband binary system. (16)

13. (a) Using Gram Schmidt Orthogonalization procedure, find the set of orthonormal basis functions to represent $s_1(t), s_2(t), s_3(t)$ and $s_4(t)$ shown in the figure. (16)

$S_1(t) = 2 \quad 0 \le t \le T/3; \quad S_2(t) = 2 \quad 0 \le t \le 2T/3$
$S_3(t) = 2 \quad T/3 \le t \le T; \quad S_4(t) = 2 \quad 0 \le t \le T$

Or

(b) Derive an expression for bit error probability of binary frequency shift keying system in the presence of Additive white Gaussian noise channel. Assume that coherent receiver is employed. (16)

14. (a) Consider a (7,4) cyclic code with generator polynomial $g(X) = 1 + X + X^3$. Draw the encoder and syndrome calculator. Obtain the code words for the message 1100. Calculate the syndrome calculator output when the codeword of the message 1100 is applied for the conditions

(i) Without error and

(ii) The least significant bit (LSB) is in error. (16)

Or

(b) A Convolutional code is described by $g1 = [1\ 0\ 1], g^{-2} = [010] g3 = [110]$ Find the transfer function and the free distance of the code. (16)

15. (a) Generate PN sequence of (4,1) four stage feedback shift register with initial state of the shift register is 1111. Verify the balance, run and correlation properties of maximal length sequence. (16)

Or

(b) Explain the concept of direct sequence spread spectrum communication system with coherent binary phase shift keying. Derive an expression for jamming margin. (16)
