Code: 13A04502

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B.Tech III Year I Semester (R13) Supplementary Examinations June 2016
DIGITAL COMMUNICATION SYSTEMS
(Electronics and Communication Engineering)

Time: 3 hours   Max. Marks: 70

PART – A
(Compulsory Question)
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1   Answer the following: (10 X 02 = 20 Marks)
   (a)   What is meant by quantization error? How to reduce it?
   (b)   What is the basic principle of prediction filter in DPCM and give expression for it?
   (c)   What is the difference between base band transmission and band pass transmission?
   (d)   Draw eye pattern and explain the significance of eye pattern for monitoring the performance of base band PAM system.
   (e)   Draw signal constellation diagrams for PSK and QPSK.
   (f)   What is M-ary PAM system? Give expression for probability of error for an M-ary PAM system.
   (g)   Compare coherent and non coherent modulation techniques with bandwidth and power requirements.
   (h)   What is coherent system? Draw the diagram of coherent system of signal reception.
   (i)   What is the difference between FEC system and ARQ system?
   (j)   Explain systematic code word and syndrome vector.

PART – B
(Answer all five units, 5 X 10 = 50 Marks)

UNIT – I

2 (a)   What are the limitations of Delta modulation? Explain with a neat block diagram, the operation of a Adaptive delta modulation that eliminates the different noises that are occurring in Delta modulation.
   (b)   In a single integration DM system, the voice signal is sampled at a rate of 32 kHz, similar to PCM. The maximum signal amplitude is normalized as Amax = 1.
           (i) Determine the minimum value of the step size to avoid slope overload.
           (ii) Determine the granular noise power No if the voice signal bandwidth is 1.7 kHz.
           (iii) Assuming that the voice signal is sinusoidal, determine So and the SNR.

OR

3 (a)   Explain the basic principle and operation of TDM with neat diagram.
   (b)   What is Line coding? Draw the wave forms for different types of Line codes for data pattern 1101001 and explain.

UNIT – II

4 (a)   With the help of a block diagram explain baseband binary data transmission.
   (b)   A binary PAM wave is to be transmitted over a baseband channel with an absolute maximum bandwidth of 75 kHz. The bit duration is 10 µs. Find the raised cosine spectrums that satisfy these requirements.

OR

5 (a)   Explain the principle and operation of correlative coding.
   (b)   For input binary data 1011101 obtain the output of duo binary encoder and also the output of decoder.

UNIT – III

6 (a)   Explain about the Gram-Schmidt process in band pass digital transmission.
   (b)   Explain basic principle and operation of correlation receiver.

OR

7 (a)   What is Matched filter? Derive an expression for probability of error of a Matched filter receiver.
   (b)   Explain equivalence of correlation and matched filter receivers.

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8   (a)   Explain the generation and reception of QPSK signals with a neat block diagram.

    (b)   A binary data is transmitted over a microwave link at the rate of 10^6 bits/sec and the PSD of the noise at the receiver input is 10^{-10} watts/Hz. Find the average carrier power required to maintain an average probability of error $P_e \leq 10^{-4}$ for coherent binary PSK.

OR

9   (a)   Explain M-ary digital modulation techniques.

    (b)   Derive the expression for probability of error for coherent FSK.

10   (a)   Design a syndrome calculator for a (7, 4) cyclic Hamming code generated by the polynomial $g(x) = x^3 + x + 1$. Calculate the syndrome for the received code vector 100101.

    (b)   A decimal number N was transmitted using seven bit even parity Hamming code. After transmission, it was received as 1101101. Is there any error introduced during transmission. What is the value of N?

OR

11   Construct state diagram & Trellis code tree for the Convolution encode shown in figure below, find the coded sequence for the input sequence 1 1 0 0. If the received sequence has an error in the 4th bit. How Viterbi algorithm is used to correct the errors.

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