Code: 15A04502 **R15**

B.Tech III Year I Semester (R15) Supplementary Examinations June/July 2019

DIGITAL COMMUNICATION SYSTEMS

(Electronics and Communication Engineering)

Time: 3 hours Max. Marks: 70

PART – A

(Compulsory Question)

*****

1 Answer the following: (10 X 02 = 20 Marks)

(a) State sampling theorem.
(b) What is meant by uniform and non uniform quantization?
(c) Discuss how pulse shaping reduce ISI.
(d) Point out duo binary system. What are the drawbacks of it?
(e) Illustrate about constellation diagram.
(f) Examine correlative level coding.
(g) Define QPSK.
(h) List the features of DPSK.
(i) What is hamming distance?
(j) List the advantages of convolutional codes.

PART – B

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

UNIT – I

2 Explain in detail Non-Uniform quantization.

OR

3 Explain delta modulation in detail with a suitable diagram.

UNIT – II

4 What is Intersymbol interference? Explain how raised cosine spectrum reduces ISI.

OR

5 (a) Explain how eye pattern in used to study the performance of ISI.
(b) Construct duo binary system with and without precoder for the binary data sequence 001101001.

UNIT – III

6 What is Matched filter? Derive an expression for probability of error of a matched filter receiver.

OR

7 (a) Explain basic principle and operation of correlation receiver.
(b) Explain maximum likelihood decoding in detail.

UNIT – IV

8 Explain coherent generation and detection of BFSK signals and derive the expression for probability of error.

OR

9 (a) Explain M-ary digital modulation techniques.
(b) Derive the expression for probability of error for coherent FSK.

UNIT – V

10 Mention the properties of cyclic code. Generate all possible code words for a (7, 4) cyclic code if the generator polynomial is $g(x) = 1 + x + x^3$.

OR

11 Draw the convolution encoder, state, tree and trellis diagram for the generator polynomial $g_1(x) = 1 + x + x^2$ *and* $g_2(x) = 1 + x^2$.

*****

Code: 13A04502 **R13**

B.Tech III Year I Semester (R13) Regular Examinations December 2015

DIGITAL COMMUNICATION SYSTEMS

(Electronics and Communication Engineering)

Time: 3 hours Max. Marks: 70

PART – A

(Compulsory Question)

*****

1 Answer the following: (10 X 02 = 20 Marks)

(a) Define quantization.
(b) What are the differences between ideal sampling and practical sampling?
(c) List the properties of matched filter.
(d) What is meant by Inter-symbol interference?
(e) What are the assumptions to be made in deriving the expressions for the probability of an error?
(f) Define Matched filter.
(g) What is meant by differential phase shift keying?
(h) What are the two forms of synchronization required for the operation of coherent detector?
(i) List the advantages of convolutional codes over block codes.
(j) Draw the block diagram of Forward Error Correction System.

PART – B

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

UNIT – I

2 (a) Draw and explain the block diagram of TDM system.
(b) Give the comparison of DPCM and DM with standard PCM.

OR

3 (a) Discuss the two major sources of quantizing error in DM systems.
(b) Draw and explain the block diagram of a regenerative repeater.

UNIT – II

4 (a) Explain in brief about Duobinary signaling scheme.
(b) Write a brief note on Eye pattern.

OR

5 (a) Explain in brief about Modified Duobinary signaling scheme.
(b) Describe the baseband transmission of M-ary data.

UNIT – III

6 (a) Explain the Gram-Schmidt orthogonalization procedure.
(b) Write a brief note on signal constellation diagram.

OR

7 (a) Explain the coherent detection of signals in noise.
(b) With a neat sketch explain the working of correlation receiver.

UNIT – IV

8 (a) Give the comparison of power and bandwidth requirements for various digital modulation schemes.
(b) Derive the error probability for QPSK.

OR

9 (a) Explain the generation and detection of BPSK.
(b) Discuss in brief about Non-coherent detection of binary FSK.

UNIT – V

10 (a) Explain the concept of Interleaving.
(b) Discuss in brief about sequential decoding of convolutional codes.

OR

11 (a) Describe the matrix representation of block codes.
(b) With a neat sketch describe the operation of the ARQ system.

*****

Code: 13A04502 **R13**

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)

*****

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.

Contd. in page 2

UNIT – IV

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.

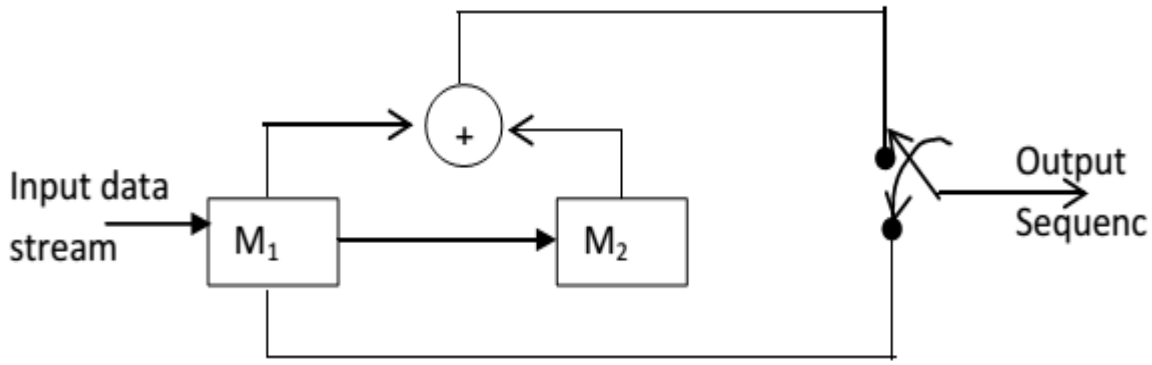
UNIT – V

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.



*****

Code: 13A04502 **R13**

B.Tech III Year I Semester (R13) Regular & Supplementary Examinations November/December 2016

DIGITAL COMMUNICATION SYSTEMS

(Electronics and Communication Engineering)

Time: 3 hours Max. Marks: 70

PART – A

(Compulsory Question)

*****

1 Answer the following: (10 X 02 = 20 Marks)

(a) Mention different types of quantization errors associated with Delta modulation system.

(b) What is differential pulse code modulation?

(c) Draw the block diagram of a modified duobinary signaling scheme.

(d) List the merits of eye pattern in pulsed binary data transmission system.

(e) State the properties of matched filter receiver.

(f) Obtain the signal constellation of 8 PSK modulated symbols.

(g) Write all the important performance parameters considered for deciding a particular digital modulation technique.

(h) Consider a binary sequence 011010. Draw the QPSK modulated waveform.

(i) What is the need of error correcting code?

(j) The parity check matrix for a (7,4) linear block code is given by: $H=\begin{bmatrix}1&1&1&0&1&0&0\\0&1&1&1&0&1&0\\1&1&0&1&0&0&1\end{bmatrix}$. Find the codeword for the input message combination of 1010.

PART – B

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

UNIT – I

2 A linear delta modulator is designed to operate on speech signals limited to 3.4 kHz. The specifications of the modulator are as follows. Sampling rate = $10f_{Nyquist}$, Where $f_{Nyquist}$ is the Nyquist rate of the speech signal, step sizeΔ = 100 mV. The modulator is tested with a 1 kHz sinusoidal signal. Determine the maximum amplitude of this test signal required to avoid slope over load distortion.

OR

3 Explain with neat block diagram, encoding of analog signals using Pulse Code modulation technique.

UNIT – II

4 What is intersymbol interference? Explain the behavior of intersymbol interference for the baseband binary PAM transmission system.

OR

5 Explain the operation of duo-binary encoding scheme with neat block diagram and necessary mathematical equations. Also perform the encoding and decoding of binary sequence using duobinary signalling scheme.

UNIT – III

6 Explain with neat block diagram the structure and behavior of Matched filter receiver.

OR

7 State and prove Gram-Schmidt orthogonalization procedure.

UNIT – IV

8 Derive the expression for bit error probability of a binary phase shift keying modulation.

OR

9 Compare the transmission power, bandwidth and bit error rate parameters of various digital modulation techniques.

UNIT – V

10 Explain the operation of convolution code generation by using an appropriate shift register and modulo-2 adder configurations.

OR

11 Consider a (6, 3) systematic linear block code, the three parity-check digits C4, C5 and C6 are C4 = d1+d2+d3, C5= d1+ d2 and C6= d1+d3. Construct the appropriate generator matrix for this code and all possible code words.

*****

Code: 13A04502

SS

B.Tech III Year II Semester (R13) Regular & Supplementary Examinations May/June 2017

DIGITAL COMMUNICATION SYSTEMS

(Electronics and Communication Engineering)

Time: 3 hours Max. Marks: 70

PART – A

(Compulsory Question)

*****

1 Answer the following: (10 X 02 = 20 Marks)

(a) Compare amplifier and regenerative repeater.
(b) List the drawbacks of DM.
(c) Find matched filter for a rectangular pulse g(t) of amplitude A and duration T.
(d) Define Duo binary signaling. What are the disadvantages of it?
(e) What is Schwarz inequality?
(f) Draw the block diagram of correlation receiver.
(g) Define bandwidth efficiency.
(h) Draw signal space diagram of QPSK.
(i) Verify that the given code C = {0 0 0, 1 1 1} is linear code or not.
(j) Show that the code C= {0 0 0, 1 0 0, 0 1 1, 1 1 1} is not cyclic.

PART – B

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

UNIT – I

2 (a) State and prove sampling theorem.
(b) Compare PCM, DPCM & DM.

OR

3 (a) Draw and explain the block diagram of TDM.
(b) Explain operation of ADPCM system.

UNIT – II

4 (a) Explain inter symbol interference with required equations.
(b) What are the practical difficulties encountered with the ideal Nyquist channel and how to overcome them?

OR

5 (a) What are properties of matched filter?
(b) Explain how an eye pattern provides a great deal of useful information about the performance of a data transmission system.

UNIT – III

6 (a) Explain Gram-Schmidt orthogonalization procedure.
(b) Explain correlation receiver with neat block diagram briefly.

OR

7 Explain conversion of AWGN channel into vector channel.

UNIT – IV

8 Explain coherent generation and detection of BPSK signals and derive the expression for probability of error.

OR

9 (a) Explain non-coherent binary frequency shift keying.
(b) Explain generation and detection of DPSK signals.

Contd. in page 2

Code: 13A04502

SS

UNIT – V

10 (a) For a (6,3) systematic linear block code, the three parity check bits c_4, c_5 and c_6 are formed from the following equations: $c_4 = d_1 \oplus d_3$

$c_5 = d_1 \oplus d_2 \oplus d_3$

$c_6 = d_1 \oplus d_2$

(i) Write down the generator matrix G.

(ii) Construct all possible code words.

(iii) Suppose that the received word is 010111. Decode this received word by finding the location of the error and the transmitted data bits.

(b) Consider a (7, 4) cyclic code with $g(x) = 1 + x + x^3$.

(i) Let data word d = (1 0 1 0). Find the corresponding code word.

(ii) Let the code word c = (11 0 0 1 0 1). Find the corresponding data word.

OR

11 Write a short notes on:

(a) Error correction and detection codes.

(b) Automatic Retransmission Query (ARQ) Systems.

(c) Linear block codes.

(d) Convolutional codes.

*****

Code: 15A04502 **R15**

B.Tech III Year I Semester (R15) Supplementary Examinations June 2018

DIGITAL COMMUNICATION SYSTEMS

(Electronics and Communication Engineering)

Time: 3 hours Max. Marks: 70

PART – A

(Compulsory Question)

*****

1 Answer the following: (10 X 02 = 20 Marks)

(a) Differentiate uniform and non-uniform quantization.
(b) What is the role of regenerative repeaters in PCM?
(c) State the properties of matched filter.
(d) What is ISI?
(e) Illustrate the geometric representation of energy signals for a two-dimensional signal space with three signals, that is, N = 2 and M = 3.
(f) With a neat diagram, explain the vector receiver part of the correlation receiver.
(g) Draw the block diagram for QPSK receiver.
(h) Plot the BPSK signal for the given sequence 0010110010.
(i) What is the difference between block code and convolution code?
(j) Find the hamming distance between 101010 and 010101.If the minimum hamming distance of a (n, k) linear block code is 3, what is its minimum hamming weight?

PART – B

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

UNIT – I

2 With neat block diagram, explain the PCM communication system.

OR

3 With a neat block diagram, explain the delta modulation and demodulation also discuss the types of quantization errors occurring in it.

UNIT – II

4 Discuss about the Nyquist's criterion for distortion less base band binary transmission.

OR

5 Explain briefly about baseband M array PAM transmission.

UNIT – III

6 Explain the methods to find basis function in Gram-Schmidt Orthogonalization procedure.

OR

7 What is matched filter receiver? Obtain the impulse response of the matched filter.

UNIT – IV

8 Discuss about the bit error probability and power spectra of BPSK signal.

OR

9 With block diagram, explain the generation and detection of DPSK.

UNIT – V

10 Consider a (6, 3) linear block code whose generator matrix is:

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

(i) Determine if the code is a Hamming code. Find the parity check matrix H of the code in systematic form. (ii) Find the encoding table for the linear block code. (iii) What is the minimum distance d_{min} of the code? How many errors can the code detect? How many errors can the code correct? (iv) Find the decoding table for the linear block code.

OR

11 A convolutional encoder has single shift register with two stages three modulo-2 adders and an output multiplexer. The following generator sequences are combined by the multiplexer to produce the encoded output.

$g_1 = (1,0,1)$; $g_2 = (1,1,0)$; $g_3 = (1,1,1)$

(i) Draw the block diagram of the encoder
(ii) For the message sequence (10011), determine the encoded sequence.

*****