R16

Code No: 135AK

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech III Year I Semester Examinations, May/June - 2019
DIGITAL COMMUNICATIONS
(Electronics and Communication Engineering)

Time: 3 hours **Max. Marks: 75**

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART - A

(25 Marks)

1.a) What is the need for encoding the output of quantizer in a PCM system. [2]
b) A certain low pass band limited signal x(t) is sampled and the spectrum of sampled version has the first guard band from 1500Hz to 1900Hz. Calculate the sampling frequency? What is the maximum frequency of the signal? [3]
c) What is meant by syndrome in linear block code? [2]
d) A Discrete Memory less Source X has five equally likely symbols. Construct Huffman code and calculate the efficiency of the code? [3]
e) Write the properties of matched filter. [2]
f) What is ISI? What are the causes of ISI? [3]
g) Draw PSK and QPSK wave form of bit stream 10001010111. [2]
h) Compare PSK and QAM. [3]
i) A DSSS system has T_b= 4.095 ms and T_c = 1μs. Assume the probability of error is not required to exceed 10^{-5}. Find jamming margin. [2]
j) If N flip flops are used to generate the PN sequence and Tc is the chip period, what is the maximum time after which the PN sequence repeats itself? [3]

PART - B

(50 Marks)

2.a) Explain how message signal is reconstructed from its samples. Also illustrate the affect of aliasing with a neat sketch.
b) A delta modulator with fixed step size of 0.75V is given a sinusoidal message signal. If the sampling frequency is 30 times the nyquist rate, determine the maximum permissible amplitude of the message signal if slope overload is to be avoided. [6+4]

OR

3.a) A voice frequency signal band limited to 3kHz is transmitted with the use of the DM system. The pulse repetition frequency is 60,000 pulses per second, and the step size is 60mV. Determine the permissible speech signal amplitude to avoid slope overload.
b) Draw the block diagram of adaptive delta modulator with continuously variable step size and explain. [4+6]

4.a) Find the (7,4) systematic and non systematic cyclic code words of the message word 1101. Assume generator polynomial as $1+x^2+x^3$.

b) State Shannon's theorem and write important features of the theorem. [6+4]

OR

5.a) Compare code efficiency of Shanon Fano coding and Huffman coding when five source messages have probabilities $m_1=0.4$, $m_2=0.15$, $m_3=0.15$, $m_4=0.15$, $m_5=0.15$.

b) Why does sequential decoding method for convolution code take much less time for decoding than the exhaustive search method. [6+4]

6.a) What is raised cosine spectrum. Discuss how it helps to avoid ISI.

b) A PAM system has a uniform quantizer followed by a v-bit encoder. Show that the rms SNR is approximately given by (1.8+6v) dB. Assume sinusoidal input. [5+5]

OR

7.a) Describe nyquist criterion for distortion less base band transmission.

b) A set of signals (k = 1,2,3,4) is given by $S_k(t) = \cos(wt+k\,\pi/2)$ $0\leq t\leq k2\pi/2w = 0$
$= 0$ otherwise.
Use the Gram-Schmidt procedure to find and orthogonal set of functions in which the functions $S_k(t)$ can be expanded. [5+5]

8.a) Derive the bit error probability of a coherent ASK signaling scheme.

b) Draw the block diagram of BPSK modulator and explain how synchronization problem is avoided for its detection. [5+5]

OR

9.a) Explain non coherent ASK detector with neat circuit diagram.

b) Explain the operation of non coherent FSK detector. [5+5]

10.a) What is PN sequence? Mention the properties of PN sequence and explain each in detail.

b) How are spread spectrum signal and interfering signal made transparent to each other. [7+3]

OR

11.a) How is synchronization achieved in DSSS?

b) Write advantages, disadvantages and applications of spread spectrum modulation. [5+5]

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