14EC505

Hall Ticket Number:

II/IV B.Tech DEGREE EXAMINATION

OCTOBER, 2016 — **Electronics & Communication Engineering**

Third Semester — **Digital Communication**

Time: Three Hours **Maximum :** 60 Marks

Answer Question No.1 compulsorily. (1X12 = 12 Marks)

Answer ONE question from each unit. (4X12=48 Marks)

1. Answer all questions (1X12=12 Marks)

a State μ-law and A-law.

b Sketch Manchester code and Bi-polar Return to Zero for the binary sequence 1 0 0 1 0 1 1 0.

c Define ISI.

d Define Signal Constellation.

e Draw signal space diagram of coherent QPSK.

f Distinguish between ASK, FSK and PSK.

g Define Discrete Memory less Source.

h Define channel capacity of a discrete memory less channel.

i State any two properties of mutual information between random variables X and Y.

j Define slow and fast frequency hopping.

k Define Hamming distance.

l State the properties of Syndrome.

UNIT – I

2.a Discuss how a continuous signal is transmitted and received in digital baseband Delta modulationscheme. 6M

2.b The signal $m(t) = 6\sin(2\pi t)V$ is transmitted using a 4-bit binary PCM system. The quantizer is ofmidrise type, with a step-size of 1*V***.** Sketch the resulting PCM wave for one complete cycle of the input. Assume a sampling rate of four samples per second with samples taken at $t = \pm\frac{1}{8}, \pm\frac{3}{8}, \pm\frac{5}{8} \ldots . sec.$ 6M

(OR)

3.a State the condition for distortion less baseband transmission in a channel and describe the response of ideal channel. 6M

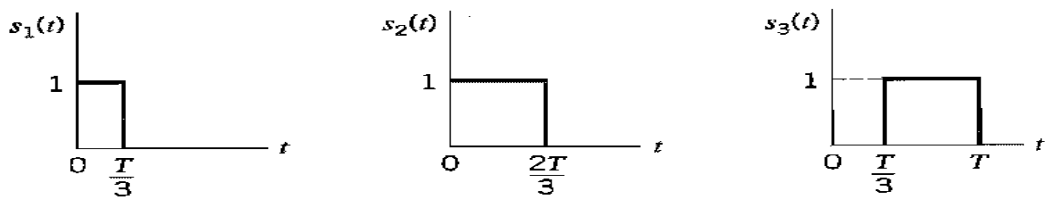
3.b The binary data stream 0 0 1 1 0 1 0 0 1 is applied to the input of a duo-binary system.

i. Construct the duo-binary coder output and corresponding receiver output without a pre-coder.

ii. Construct the duo-binary coder output and corresponding receiver output with a pre-coder. 6M

UNIT – II

4.a Consider the signals $s1(t), s2(t) and\ s3(t)$shown in below figure. Find orthonormal basis functions for the above signals using Gram-Scmidtorthogonalization.



6M

4.b Derive the expression for Probability of error for coherent detector. 6M

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(OR)

5.a The binary sequence 1 1 0 0 1 0 0 0 1 0 is applied to the DPSK transmitter.
   i. Sketch the resulting waveform at the transmitter output.
   ii. Applying this waveform to the DPSK receiver, show that in the absence of noise, the original binary sequence is reconstructed at the receiver output. 6M

5.b Define the expression for average probability of symbol error for coherent BFSK. 6M

UNIT – III

6.a Define Entropy. State properties of entropy and derive the expression of entropy for binary memory less source. 6M

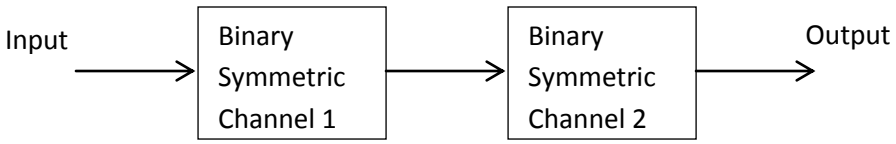
6.b Consider a sequence of letters of the signal alphabet with their probabilities of occurrence as given here

Letter	A	I	L	M	N	O	P	Y
Probability	0.1	0.1	0.2	0.1	0.1	0.2	0.1	0.1

Compute two different Huffman codes for this alphabet. Hence for each of the two codes, find the average code-word length over the ensemble of letter. 6M

(OR)

7.a Two binary symmetric channels are connected in cascade, as shown in figure. Find the overall channel capacity of the cascade connection, assume that both channel have the same transition probability. 6M



7.b Derive the expression for channel capacity of a discrete memory less channel. 6M

UNIT – IV

8.a State the encoding procedure for an (n,k) cyclic code and also discuss the difference between convolution codes and cyclic codes. 6M

8.b Consider the (7,4) linear block code whose generator matrix is given below. Find all the code vectors. 6M

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

(OR)

9.a Compare Slow and Fast Frequency Hopping Spread Spectrum with an example. 6M

9.b Derive the expression for process gain. 6M