

B. TECH.
(SEM VI) THEORY EXAMINATION 2018-19
DIGITAL COMMUNICATION

Time: 3Hours

Total Marks: 70

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION-A

- 1. Attempt all questions in brief.** **7 x 2 = 14**
- In PSK and FSK modulation techniques which one is better and why?
 - Define signal level and data level.
 - What is mean and variance of random variable?
 - Calculate error probability of 16QAM.
 - What are the types of error control method?
 - Give any four application of DS-SS system.
 - What is signal space?

SECTION-B

- 2. Attempt any three of the following.** **3 x 7 = 21**
- Explain the block diagram of digital communication system. What are noise and bandwidth limitation of any communication system.
 - Explain QPSK modulation and Demodulation Techniques with block diagram. Sketch QPSK Waveform for the sequence 0110100.
 - Explain random process and give its classification.
 - Explain Near-Far problem in CDMA system. Explain MUD and how it is useful to control Near-Far problem.
 - A spread spectrum communication system is characterized by the following parameters. Duration of each information bit is 4.095 ms, chip duration of pn sequence is 1 ms. Calculate the processing gain and jamming margin in dB if $(E_B/N_0) = 10$ and probability of error $P_e = 0.5 \times 10^{-3}$.

SECTION-C

- 3. Attempt any one part of the following.** **1 x 7 = 7**
- Write down the steps to solve Huffman coding. Determine the Huffman code and efficiency of code for the following message with their probabilities given

a	b	c	d	e	f	g
0.05	0.15	0.2	0.05	0.15	0.3	0.1

b. Two dice are rolled, find the probability that the sum is

- 1) Equal to 1
- 2) Equal to 4
- 3) Less than 13

4. Attempt any one part of the following.

1 x 7 = 7

- a. Find out the expression for PSD of polar NRZ format. Give the properties of line coding. Draw polar NRZ for the bit stream 110011.
- b. Differentiate between DSSS and FHSS on the basis of various parameters.

5. Attempt any one part of the following.

1 x 7 = 7

- a. A random variable X has the uniform distribution given by,

$$f_x = 1/2\pi \quad \text{for } 0 \leq x \leq 2\pi$$

$$= 0 \quad \text{otherwise}$$

Determine $E[x]$, $E[x^2]$, and σ_x .

- a. A message 101101 is to be transmitted in the cyclic code with generator polynomial $g(x) = 1 + x^3 + x^4$. Obtain the transmitted code word. How many check bits does the encoded message contain? Draw the encoding arrangement for the same.

6. Attempt any one part of the following.

1 x 7 = 7

- a. Describe scrambler and unscrambler with the help of suitable diagram.
- b. Explain Central limit theorem by using Gaussian distribution.

7. Attempt any one part of the following.

1 x 7 = 7

- a. What do you understand by statistical averages? Explain all its properties.
- b. Describe in brief OFDM communication system.