Printed Pages: 02 **Sub Code: KEC601**

Paper Id: 236549 **Roll No.** | | | | | | | | | | |

B. TECH.
(SEM VI) THEORY EXAMINATION 2022-23
DIGITAL COMMUNICATION

Time: 3 Hours ***Total Marks: 100***

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

SECTION A

1. Attempt *all* questions in brief. 2 x 10 = 20

a. In an experiment, a dice are thrown twice in succession. Determine the probability of outcome that sum of outcome in the dice is 7.
b. Define the term mean and variance.
c. Sketch the block diagram of Digital Communication.
d. Discuss EYE diagram in brief.
e. Explain the advantages of PSK modulation technique over ASK modulation.
f. Compare the bandwidth requirement of ASK, PSK and FSK modulation.
g. Describe PN sequence.
h. Discuss disadvantages of non-coherent FSK.
i. Describe that the mutual information is symmetric in nature.
j. Explain the properties of cyclic code.

SECTION B

2. Attempt any *three* of the following: 10x3=30

a. Explain the properties of a random variable.
b. Describe the term Gram-Schmidt orthogonalization scheme.
c. Demonstrate ASK modulation and demodulation technique.
d. With the help of block diagram explain DSSS.
e. Describe the term Mutual Information and Entropy.

SECTION C

3. Attempt any *one* part of the following: 10x1=10

a. Demonstrate Random process, it's classification and properties.
b. Describe the following terms:
(i) Power spectral density
(ii) Autocorrelation function
(iii) Gaussian Random Process

4. Attempt any *one* part of the following: 10x1=10

a. Illustrate the term ISI. Also explain the method to overcome ISI.
b. Describe the properties of Line coding. Also derive power spectral density of polar signaling.

5. Attempt any *one* part of the following: 10x1=10

a. Illustrate the modulation and demodulation process of QPSK. Also draw constellation diagram of 4-PSK.

b. Explain the FSK modulation and demodulation in detail.

6. Attempt any *one* part of the following: 10x1=10

a. Derive the relation for Signal-to-Noise ratio of a Matched filter.

b. Illustrate the main objective behind spreading of the signal in communication system. Also describe the principle of DSSS and FHSS communication.

7. Attempt any *one* part of the following: 10x1=10

a. A memoryless source emits six messages with probability 0.3, 0.25, 0.15, 0.12, 0.1 and 0.08.
(i) Find the binary Huffman code
(ii) Determine its average word length
(iii) The efficiency
(iv) Redundancy

b. For a given generator polynomial

$$\mathbf{g}(x) = \mathbf{1} + x^2 + x^3$$

(i) Find the generator matrix G for a systematic (7,4) cyclic code.
(ii) Find the systematic code for message bits 1010.