



R18 Regulation

Subject code: 2P5DD

# TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A+' Grade)

## B.Tech V Semester Supplementary Examinations, July 2024

### DIGITAL COMMUNICATIONS (ECE)

Maximum Marks: 70

Date: 26.07.2024 Duration: 3 hours

- Note:
1. This question paper contains two parts A and B.
  2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
  3. Part B consists of 5 Units. Answer any one full question from each unit which carries 10M.
  4. Each question carries 10 marks and may have a, b, c, d as sub questions.

#### Part-A

All the following questions carry equal marks (10X2M=20 Marks)		CO	Bloom Tx
1	Define Aliasing and write the condition for it.	1	L1
2	What is Nyquist rate and Nyquist interval?	1	L1
3	Sketch the PSK waveforms for a given input data "110100".	2	L1
4	What is Frequency Shift Keying?	2	L1
5	Define entropy and give the expression for it.	3	L1
6	State Shannon's Hartley theorem.	3	L1
7	Write the formula for code efficiency?	4	L1
8	Define encoding.	4	L1
9	What is the bandwidth of spread signal?	5	L1
10	List out the properties of PN sequence.	5	L1

#### Part-B

Answer All the following questions. (5X10M=50Marks)			
11	With a neat block diagram, explain the elements of digital communication system. [10]	1	L2
OR			
12	Prove that the signal to quantization noise power ratio in Pulse Code Modulation [PCM] system is $(4.8+6v)$ dB. [10]	1	L2
13	Describe the modulation and non-coherent detection of BFSK with the help of a neat diagram. [10]	2	L2
OR			
14	Explain the Receiver of 8-PSK technique with neat sketch. [10]	2	L2
15	Apply Shannon-Fano coding procedure for a discrete memory less source 'X' with six symbols X1, X2, X3, X4, X5, X6 find a compact code for every symbol if the probability distribution is as follows: X1 = 0.3, X2=0.25, X3=0.2, X4= 0.12, X5 = 0.08, X6=0.05. Calculate entropy of the source, average length of the code, efficiency and redundancy of the code. [10]	3	L2

	OR														
16	<p>An information source produces a sequence of independent symbols having the following probabilities. [10]</p> <table border="1" style="margin-left: 20px;"> <tr> <td>symbol</td> <td>S1</td> <td>S2</td> <td>S3</td> <td>S4</td> <td>S5</td> </tr> <tr> <td>probability</td> <td>0.4</td> <td>0.2</td> <td>0.1</td> <td>0.2</td> <td>0.1</td> </tr> </table> <p>Construct binary code using Huffman encoding procedure and find its efficiency [10]</p>	symbol	S1	S2	S3	S4	S5	probability	0.4	0.2	0.1	0.2	0.1	3	L2
symbol	S1	S2	S3	S4	S5										
probability	0.4	0.2	0.1	0.2	0.1										
17	<p>The generator matrix for a (6, 3) block code is given by [10]</p> $G = \begin{bmatrix} 1 & 0 & 0 & 0 & 1 & 1 \\ 0 & 1 & 0 & 1 & 0 & 1 \\ 0 & 0 & 1 & 1 & 1 & 0 \end{bmatrix}$ <p>a) Find the code vectors.  b) Find the parity check matrix.  c) Find the error syndrome.</p>	4	L2												
	OR														
18	<p>The parity check matrix of a particular (6, 3) linear block code is [10]</p> $H = \begin{bmatrix} 1 & 1 & 1 & 0 & 1 & 0 & 0 \\ 1 & 1 & 0 & 1 & 0 & 1 & 0 \\ 1 & 0 & 1 & 1 & 0 & 0 & 1 \end{bmatrix}$ <p>a) Find generator matrix.  b) List all the code vectors.  c) Minimum distance of the code vector.  d) How many errors can be detected and how many errors corrected.</p>	4	L2												
19	<p>Explain with a neat sketch, the Direct Sequence Spread Spectrum [ DS-SS] Coherent PSK transmitter and receiver. [10]</p>	5	L2												
	OR														
20	<p>Explain the Frequency hopping spread spectrum [FHSS] modulation. [10]</p>	5	L2												