



R20 Regulation

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

Subject code:3P5DC

B.Tech V Semester Regular Examinations, January 2023

DIGITAL COMMUNICATIONS
(Electronics and Communication Engineering)

Maximum Marks: 70

Date:11.01.2023 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)

- 1 Define sampling theorem?
- 2 What is the advantage of digital communication over analog communication?
- 3 What is the difference between coherent and non-coherent type of detection?
- 4 Draw the waveform of ASK modulation for 10110011.
- 5 Compare the single and mutual information?
- 6 Define Shannon Hartley law.
- 7 What is the difference of parity and generator matrix?
- 8 Explain hamming distance with an example
- 9 Classify various types of spread spectrum modulation techniques
- 10 Write about PN sequence.

Part-B

Answer All the following questions.

(5X10M=50Marks)

- 11 With a neat block diagram explain about Pulse code modulation and demodulation technique? Explain each block in detail. (10M)

OR

- 12 What is the Quantization error? How much it will be affected in Delta Modulation? How to overcome the Quantization error in PCM and DPCM-explain with an equation? (10M)

- 13 How to generate the FSK signal and how it is demodulated explain with neat sketches. (10M)

OR

- 14 A. Explain how to generate PSK signal with neat sketch (5M)
B. Explain how to demodulate the PSK signal with neat sketch (5M)

- 15 A. Explain the Lempel-Ziv code with an example (6M)
B. What is meant by matched filter and how it is useful at the receiver section (4M)

OR

- 16 A. An analog signal band-limited to 10 kHz is quantized in 8 levels of a PCM system with probabilities of 1/4, 1/5, 1/5, 1/10, 1/10, 1/20, 1/20, and 1/20 respectively. Calculate the entropy and the rate of information. (5M)

B. A discrete memory less source has an alphabet of seven symbols with probability for its output as described here: 0.2,0.15,0.25,0.01,0.2,0.09,0.1. Compute the Huffman code for this source and find its efficiency? (5M)

- 17 Consider a (7,4) linear block code with the parity-check matrix H given by:

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

Construct code words for this (7, 4) code and show that this code is a Hamming code. (10M)

OR

- 18 A. Explain sequential decoding for convolutional codes. (4M)
 B. Draw the state diagram, tree diagram, and trellis diagram for k=3, rate 1/3 code generated by $g_1(x) = 1+x^2$, $g_2(x) = 1+x$ and $g_3(x) = 1+x+x^2$. (6M)

- 19 Explain the DSSS transmitter and receiver with neat sketch. (10M)

OR

- 20 Explain the advantages and applications of spread spectrum modulation. (10M)