*R20 Regulation* *Subject code: 3P5DC*

# TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

## B.Tech V Semester Supplementary Examinations, November 2025

# DIGITAL COMMUNICATIONS

## *(ECE)*

***Maximum Marks: 70*** Date: 22.11.2025 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.**
**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) | | Marks | CO | BTL |
|---|---|---|---|---|
| 1 | List the advantages of digital communication systems. | 2M | 1 | L1 |
| 2 | Write the formula for output signal-to-quantization ratio in DM. | 2M | 1 | L1 |
| 3 | Define Frequency Shift Keying. | 2M | 2 | L1 |
| 4 | List the drawbacks of ASK. | 2M | 2 | L1 |
| 5 | Define information rate (R). | 2M | 3 | L1 |
| 6 | List any two properties of Information. | 2M | 3 | L1 |
| 7 | Define Hamming distance and calculate its value for two code words 11001 and 10100. | 2M | 4 | L1 |
| 8 | Define code rate for (n, k) linear block code. | 2M | 4 | L1 |
| 9 | What is the bandwidth of spread signal? | 2M | 5 | L1 |
| 10 | What is Direct Sequence Spread Spectrum? | 2M | 5 | L1 |

Part-B

| Answer All the following questions. (5X10M=50Marks) | | Marks | CO | BTL |
|---|---|---|---|---|
| 11 | Analyse the Statement & proof of sampling theorem in time domain. | 10M | 1 | L2 |
| | OR | | | |
| 12 | With the help a neat diagram, demonstrate the transmitter and receiver of DM. | 10M | 1 | L2 |
| 13 | With the help of waveforms, demonstrate the modulation and non-coherent detection of BFSK. | 10M | 2 | L2 |
| | OR | | | |
| 14 | Illustrate the BPSK Receiver with neat sketch. | 10M | 2 | L2 |
| 15 | Investigate and prove that the capacity of a white band limited Gaussian channel is B $\log_2$(1+S/N) bits/sec. | 10M | 3 | L2 |
| | OR | | | |
| 16 | An information source produces a sequence of independent symbols having the following probabilities. | 10M | 3 | L2 |

| Symbol | S1 | S2 | S3 | S4 | S5 |
|---|---|---|---|---|---|
| probability | 0.4 | 0.2 | 0.1 | 0.2 | 0.1 |

| | | | | |
|---|---|---|---|---|
| | Differentiate binary code using Huffman encoding procedure and find its efficiency. | | | |
| 17 | The parity check matrix of a particular (7, 3) linear block code is<br>$H=\begin{bmatrix}1&1&1&0&1&0&0\\1&1&0&1&0&1&0\\1&0&1&1&0&0&1\end{bmatrix}$<br>a) build generator matrix<br>b) List all the code vectors.<br>c) Minimum distance of the code vector.<br>d) How many errors can be detected and how many errors corrected | 10M | 4 | L2 |
| | OR | | | |
| 18 | The generator matrix for a (6, 3) block code is given by<br>$G=\begin{bmatrix}1&0&0&0&1&1\\0&1&0&1&0&1\\0&0&1&1&1&0\end{bmatrix}$<br>a) calculate the code vectors.<br>b) calculate the parity check matrix.<br>c) calculate the error syndrome. | 10M | 4 | L2 |
| 19 | Analyse the process of Pseudo-Noise (PN) sequence generation. | 10M | 5 | L2 |
| | OR | | | |
| 20 | Explain the architecture of a Direct Sequence Spread Spectrum (DS-SS) modulation with neat diagram. | 10M | 5 | L2 |