| III Year-IISemester | | T | P | C |
|---|---|---|---|---|
| | | 4 | 0 | 3 |

**DIGITAL COMMUNICATION (RT32043)**

## PrerequisiteCourse:

Analog communication

## CourseDescriptionandObjectives:

- understand pulse digital modulation systems such as PCM,DPCM and DM.
- understand various digital modulation techniques and able to analyze various systems for their performance in terms of probability of error.
- study the concept of entropy and need for source coding.
- study Block codes, cyclic codes and convolution codes.

## CourseOutcomes:

Upon completion of the course, the student will be able to achieve the following outcomes.

| Cos | CourseOutcomes | POs |
|---|---|---|
| 1 | Determine the performance of different waveform coding techniques for | 3 |
| 2 | Determine the probability of error for various digital modulation schemes | 3 |
| 3 | Analyze different source coding techniques | 3 |
| 4 | Compute and analyze different error control coding schemes for the | 3 |

## Syllabus:

**UNIT I**

**PULSE DIGITAL MODULATION:** Elements of digital communication systems, advantages of digital communication systems, Elements of PCM: Sampling, Quantization & Coding, Quantization error, Companding in PCM systems. Differential PCM systems (DPCM). Delta modulation, its draw backs, adaptive delta modulation, comparison of PCM and DM systems, noise in PCM and DM systems.

**UNIT II**

**DIGITAL MODULATION TECHNIQUES:** Introduction, ASK, FSK, PSK, DPSK, DEPSK, QPSK, M-ary PSK, ASK, FSK, similarity of BFSK and BPSK.

**UNIT III**

**DATA TRANSMISSION :** Base band signal receiver, probability of error, the optimum filter, matched filter, probability of error using matched filter, coherent reception, non-coherent detection of FSK, calculation of error probability of ASK, BPSK, BFSK,QPSK.

**UNIT IV**

**INFORMATION THEORY:** Discrete messages, concept of amount of information and its properties. Average information, Entropy and its properties. Information rate, Mutual information and its properties.



**UNIT V**

**SOURCE CODING:** Introductions, Advantages, Shannon's theorem, Shanon-Fano coding, Huffman coding, efficiency calculations, channel capacity of discrete and analog Channels, capacity of a Gaussian channel, bandwidth –S/N trade off.

**UNIT VI**

**LINEAR BLOCK CODES:** Introduction, Matrix description of Linear Block codes, Error detection and error

correction capabilities of Linear block codes, Hamming codes, Binary cyclic codes, Algebraic structure, encoding, syndrome calculation, BCH Codes.

**CONVOLUTION CODES:** Introduction, encoding of convolution codes, time domain approach, transform domain approach. Graphical approach: state, tree and trellis diagram decoding using Viterbi algorithm.

**TEXT BOOKS:**

1. Digital communications - Simon Haykin, John Wiley, 2005
2. Principles of Communication Systems – H. Taub and D. Schilling, TMH, 2003

**REFERENCES:**

1. Digital and Analog Communication Systems - Sam Shanmugam, John Wiley, 2005.
2. Digital Communications – John Proakis, TMH, 1983. Communication Systems Analog & Digital – Singh & Sapre, TMH, 2004.
3. Modern Analog and Digital Communication – B.P.Lathi, Oxford reprint, 3rd edition, 2004.