III B.Tech – II Semester
(17EC601) DIGITAL COMMUNICATIONS

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	3

Pre-Requisites: Analog Communications

Course Objectives:

- Understand different pulse digital modulation techniques and their comparison
- Familiarize various digital modulation techniques and calculation of their error probabilities
- Understand the concept of entropy and different source coding techniques
- Familiarize with block codes, cyclic codes and convolution codes

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, Applicationsof PCM,DPCM,DM.
1. Applications of PCM, DPCM, DM.

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

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.

Course Outcomes:

After successful completion of the course, the students can be able to:

S. No	Course Outcome	BTL
1.	Understanding about various pulse digital techniques.	L1
2.	Analyze the concepts of digital modulation techniques	L3
3.	Design of optimum receiving techniques for digital modulated waveforms	L4
4.	Implementation of the source coding techniques based on the concept of information theory	L2
5.	Apply Linear Block codes and conventional codes for the channel coding.	L3
6.	Evaluate the performance of various digital modulation techniques	L2

Correlation of COs with POs & PSOs:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO 11	PO 12	PSO 1	PSO 2
CO 1	3	2	-	-	1	-	-	-	2	1	-	-	3	2
CO 2	3	3	2	-	1	-	-	-	2	1	-	-	3	3
CO 3	3	3	3	-	1	-	-	-	2	1	-	-	3	3
CO 4	3	3	3	-	1	-	-	-	2	1	-	-	3	3
CO 5	2	3	3	-	1	-	-	-	2	1	-	-	2	3
CO 6	3	3	3	-	1	-	-	-	2	1	-	2	3	3

Text Books:

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

Reference Books:

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