

Devi Ahilya University, Indore, India Institute of Engineering & Technology			II Year B.E. (Information Technology) (Full Time)				
Subject Code & Name	Instructions Hours per Week			Credits			
ITR4G2 Digital Communication Engineering	L	T	P	L	T	P	Total
	3	1	-	3	1	-	4
Duration of Theory Paper:3 Hours							

Learning Objectives:

- To review the basic Fourier techniques and its application in these processes.
- To provide knowledge of basic principles of analog and digital communication.
- To introduce the various processes like sampling, digital coding techniques, modulation and channel coding techniques that are used in modern telecommunication system.
- To give exposure to quantitative method of measuring information and determining the capacity of communication system.
- To provide knowledge of spread spectrum techniques.

Pre requisites: Basic exposure to signals and systems.

COURSE CONTENTS

UNIT-I

Review of Fourier techniques, Fourier techniques for linear system analysis, Fourier transform properties convolution, Error Function and complimentary error function, Introduction to analog modulation techniques like AM, FM, PM.

UNIT-II

Line coding: NRZ, RZ, Biphase, Duo binary etc. their comparison and spectrum associated with their wave forms, bandwidth of digital data. Signal and Spectra: classification of signals, Parseval's theorem, energy spectral density, power spectral density, auto-correlation, cross-correlation, random variables.

UNIT-III

Sampling and quantization, Digital coding techniques, PCM, DPCM, ADPCM, DM, ADM, vocoders, matched filter. Digital modulation techniques, BPSK, QPSK, MSK, performance analysis and comparison of digital modulation techniques in presence of noise.

UNIT-IV

Information theory: concept of amount of information, entropy, information rate, coding to increase average information per bit, Huffman coding, channel capacity, Shannon's theorem of channel capacity. Channel coding: Linear block codes, systematic Linear blocks codes, parity check matrix, syndrome testing, cyclic codes, hamming codes.

UNIT-V

Introduction to spread spectrum techniques – spread spectrum overview, spreading sequences, properties of spreading sequences, spreading gain, direct sequence spread spectrum system, jamming margin, frequency hopping system, spread spectrum applications.

Learning Outcomes:

Upon completing the course, students will be able to:

- Understand frequency domain analysis and its importance.
- Understand about the digital data transmission using line coding.
- Understand the working of transmitter and receiver in digital communication system.
- Understand how to detect and correct the errors introduced during the transmission.
- Understand basics of secured communication using spread spectrum techniques.

BOOKS RECOMMENDED:

1. Lathi B.P., “Modern Analog and Digital Communication Systems”, Oxford Univ. Press, Third edition.
2. Taub & Schilling, “Principal of Communication System”, Tata McGraw Hill publication, Fourth edition, 2007.
3. J.G. Proakis, “Digital Communication”, McGraw Hill publication, Fourth edition, 2001.
4. Haykins Simon, “Digital Communication”, Wiley Publication, Third edition, 2007.
5. Haykins Simon, “Analog and Digital Communication”, Wiley Publication, Third edition, 2007.
6. Bernard Sklar, “Digital communication”, Pearson Education, Second edition, 2007.