

<b>Devi Ahilya University, Indore, India Institute of Engineering &amp; Technology</b>				<b>ME – I Year (Spl Digital Communication) Semester- A</b>			
<b>Subject Code &amp; Name</b>		<b>Instructions Hours per Week</b>			<b>Credits</b>		
<b>DCR1C1 Modern Communication System</b>		<b>L</b>	<b>T</b>	<b>P</b>	<b>L</b>	<b>T</b>	<b>P</b>
<b>Duration of Theory Paper: 3 Hours</b>		<b>3</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>1</b>	<b>1</b>
							<b>Total</b>
							<b>5</b>

**Course Objectives:** To give exposure of all the processes like modulation, Demodulation, Channel Coding, Decoding etc. of physical layer involved in modern telecommunication systems. To analyze and evaluate performance of a digital communication system.

**Prerequisite(s):** Basic knowledge of digital communication

## COURSE CONTENTS

### UNIT -I

Review of basic concepts of communication systems, Source encoding, Speech encoding techniques (Source encoders, SBC, LPC, Hybrid coders), their applications, Base-band modulation techniques their comparison and spectrum associated with their waveforms.

### UNIT -II

Channel coding-Linear Block Codes, Convolution Codes, Turbo Codes their encoding and decoding, introduction to high level channel codes, interleaving and concatenated codes.

Digital modulation and demodulation - PSK, DPSK, QPSK, M-aryPSK, QAM, MSK and GMSK their generation, detection & performance analysis and comparison in presence of noise.

### UNIT –III

Multi-carrier modulation and OFDM, Orthogonality, Block diagram of OFDM, Applications of OFDM, Issues in OFDM systems. Spread spectrum systems: Types, PN sequences, Characteristics of PN sequences, generation and detection of DSSS and FHSS, Spreading gain, Applications to communication systems, Multi-user detection.

### UNIT –IV

Wireless channels and propagation path loss models – ISI, Types of fading, models for multi-path reception, propagation models for wireless networks, Fading mitigation techniques, Equalization principle and types (LTE, ZFE, MMSE and DFE).

### UNIT –V

Diversity techniques (frequency, time, and space), Multi-antenna systems, Smart antennas, Beamforming and MIMO system, spatial multiplexing, Tradeoffs among Diversity, Beam-forming gain & spatial multiplexing, Introduction to Cognitive Radio and Cooperative communication.

### BOOKS RECOMMENDED

- [1]. Bernard Sklar, “*Digital Communication*”, Pearson Education, 2nd Edition, 2004.
- [2]. J.G. Proakis, *Digital Communication*, McGraw Hill, 4th Edition, 2001.
- [3]. Lathi B. P., *Modern Analog and Digital Communication Systems*, 3rd Edition, Oxford Univ. Press, 2010.
- [4]. Haykins Simon, *Digital Communication*, 3rd Edition, Wiley Publication, 2005.
- [5]. I.S. Misra, *Wireless Communications and Networks*, 2nd Edition, TMH, 2009.
- [6]. A. F. Molisch, *Wireless Communications*, 2nd Edition, Willey, 2014.
- [7]. T. S. Rappaport, *Wireless Communications Principles & Practice*, 2nd Edition, PHI, 2005.