EC-304 **DIGITAL COMMUNICATIONS** **L T P C**
4 1 - 3

COURSE OBJECTIVES:

1. To understand the different types of digital modulation techniques.
2. To study the base band pulse transmission through the communication channel.
3. To understand the digital pass band transmission and the different binary modulation techniques.
4. To study about information theory and to analyze the different coding principles.
5. To understand the different error control coding techniques.

COURSE OUTCOMES:

After successful completion of the course, the students are able to

1. apply knowledge in, Elements of Digital Communication systems, Digitization techniques such as PCM, DPCM and DM, Digital carrier modulation techniques, Error Probability and detection of Baseband and Bandpass modulated signals, Measure of information, Source and Error Control Coding techniques.
2. evaluate the effect of channel noise on the performance of digital communication systems using modulation schemes.
3. evaluate the upper bounds on the performance of information sources and communication channels.
4. Analyze error control coding techniques to improve error performance in digital communication system.
5. apply the knowledge to meet the responsibilities related to professional engineering practice.

UNIT I **(15)**

PULSE MODULATION : Introduction, Sampling process, Quantization Process, Quantization Noise, Pulse Code Modulation: Encoding, Regeneration, Decoding,Noise considerations in PCM, Virtues and limitations of PCM, Delta Modulation, Differential Pulse Code Modulation (DPCM).

UNIT II **(13)**

BASE BAND PULSE TRANSMISSION : Matched filter, Properties, Intersymbol interference, Nyquist's criterion for distortionless baseband binary transmission, Ideal Nyquist channel, Correlative level coding, Duobinary signaling, Modified Duobinary signaling, General form of correlative level coding.

UNIT III **(13)**

PASSBAND DATA TRANSMISSION : Signal space analysis: Introduction, Pass band transmission model, Geometric interpretation of signals, Gram Schmidt Orthogonalization procedure, Coherent detection of signals in noise, Correlation receiver, Probability of error, Coherent BPSK, QPSK, BFSK, Detection of signals with unknown phase, Non Coherent BFSK, DPSK .

UNIT IV **(12)**

INFORMATION THEORY : Uncertainty, Information, Entropy, Properties of Entropy, Source Coding Theorem, Shannon Fano Coding, Huffman Coding, Discrete memoryless channels, Mutual information, Properties, Channel capacity, Channel coding theorem, Differential entropy and mutual information for continuous ensembles, Information capacity theorem.

UNIT V **(12)**

ERROR CONTROL CODING : Introduction, Binary Symmetric Channel, Linear Block Codes: Syndrome, Properties, Syndrome decoding, Hamming Codes, Cyclic Codes, Convolution Codes.

LEARNING RESOURCES:

TEXT BOOK(s):

Simon Haykin - Communication Systems, 4th Edition, John Wiley & Sons., 2011

REFERENCE BOOK(s):

1. Sam Shanmugam - Digital and Analog Communication Systems, John Wiley, 1979.
2. Taub and Schilling - Principles of Communication Systems, 2nd Edition, TMH, 1986.
3. John Proakis - Digital Communications, TMH,3rd Edition,1995.

WEB RESOURCES:

1. http://nptel.ac.in/courses/117105077
2. http://www.ece.utah.edu/~npatwari/ece5520/lectureAll.pdf