

B.Tech II Year II Semester

ANALOG AND DIGITAL COMMUNICATIONS

Course Code: 21EC403PC

L/T/P/C 3/1/0/4

Prerequisite: Probability theory and Stochastic Processes**Course Objectives:**

- To develop ability to analyze system requirements of analog and digital communication systems.
- To understand the generation, detection of various analog and digital modulation techniques.
- To acquire theoretical knowledge of each block in AM, FM transmitters and receivers.
- To understand the concepts of baseband transmissions.
- To analyze the various modulation techniques in different environments.

Course Outcomes:

- Analyze various continuous wave and angle modulation and demodulation techniques.
- Understand the effect of noise present in continuous wave and angle modulation techniques.
- Attain the knowledge about AM, FM Transmitters and Receivers.
- Analyze and design the various Pulse, Digital Modulation Techniques and Baseband transmission.
- Apply and analyze the various Modulation techniques in different environments.

Unit-I

Amplitude Modulation: Introduction to Communication Systems: Modulation – Types – Need for Modulation. Theory of Amplitude Modulation – Evolution and Description of AM, DSBSC and SSB Techniques. Generation and Detection of AM, DSBSC and SSB waves. Vestigial side band modulation: Time and Frequency description, Generation of VSB Modulated wave, Envelope detection of a VSB Wave pulse Carrier. SNR concepts, AM Receiver, Noise in AM, DSBSC and SSB, Threshold effect in AM systems

Unit-II:

Angle Modulation: Basic concepts, Frequency Modulation: Single tone frequency modulation, Spectrum Analysis of Sinusoidal FM Wave, Narrow band and Wide band FM, Generation of FM Waves: Direct and Indirect Method, Detection of FM Waves: Balanced Frequency discriminator, Zero crossing detector, Phase locked loop, Comparison of FM and AM, PM and FM. FM receiver, Noise in angle modulation: FM, PM. Threshold effect in FM, Pre-emphasis and De emphasis.

UNIT- III:

Pulse Modulation Types of Pulse modulation: PAM, PWM and PPM, Comparison of FDM and TDM. Pulse Code Modulation: PCM Generation and Reconstruction, Quantization Noise, Non Uniform Quantization and Companding, DPCM, DM, Noise in DM and Adaptive DM.

UNIT-IV:

Digital Modulation Techniques: BASK Modulator and Demodulator, BFSK Modulator and Demodulator, BPSK Modulator and Demodulator, QPSK Modulator and Demodulator, Differential PSK. Baseband Transmission and Optimal Reception of Digital Signal: A Baseband Signal Receiver and its probability of error, Optimum Receiver, Matched Filter, Probability of error for ASK, PSK, FSK, Inter Symbol Interference (ISI).

UNIT-V:

Spread Spectrum Modulation: Use of Spread Spectrum, Direct Sequence Spread Spectrum (DSSS), Code Division Multiple Access, Ranging using DSSS, Frequency Hopping Spread Spectrum, PN-Sequences: Generation and Characteristics, Synchronization in Spread Spectrum Systems, Gold Sequences.

TEXT BOOKS:

1. An introduction to analog and digital communications, Haykin, Simon S. Vol. 1. New York: Wiley, 1989.
2. Analog and digital communications, Sanjay Sharma
2. Communication Systems - Simon Haykin, John Wiley, 5th Ed. 2009
3. Principles of Communication Systems - Herbert Taub, Donald L Schilling, Goutam Saha, 3 rd Edition, McGraw-Hill, 2008

REFERENCE BOOKS:

1. Electronics Communication Systems-Fundamentals through Advanced-Wayne Tomasi, 5 th Edition, 2009, PHI.
2. Electronic Communications – Dennis Roddy and John Coolean , 4th Edition , PEA, 2004
3. Electronics & Communication System – George Kennedy and Bernard Davis , TMH 2004
4. Analog and Digital Communication – K. Sam Shanmugam, Willey ,2005