II Year B.Tech. ECE- II Sem **L/T/P/C**
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ANALOG & DIGITAL COMMUNICATIONS

COURSE OBJECTIVES:

1) To analyze and design various continuous wave Amplitude modulation and demodulation techniques.
2) To understand the concept of Angle modulation and demodulation, and the effect of noise on it.
3) To attain the knowledge about the functioning of different AM, FM Transmitters and Receivers.
4) To analyze and design the various Pulse Modulation Techniques (Analog and Digital Pulse modulation)
5) To understand the concepts of Digital Modulation Technique, Baseband transmission and Optimum Receiver.

UNIT – I

Amplitude Modulation: Need for modulation, Amplitude Modulation - Time and frequency domain description, single tone modulation, power relations in AM waves, Generation of AM waves -Switching modulator, Detection of AM Waves - Envelope detector, DSBSC modulation - time and frequency domain description, Generation of DSBSC Waves - Balanced Modulators, Coherent detection of DSB-SC Modulated waves, COSTAS Loop, SSB modulation - time and frequency domain description, frequency discrimination and Phase discrimination methods for generating SSB, Demodulation of SSB Waves, Vestigial side band modulation.

UNIT - II

Angle Modulation: Basic concepts of Phase Modulation, Frequency Modulation: Single tone Frequency modulation, Narrow band FM, Wide band FM, Spectrum Analysis of Sinusoidal FM Wave using Bessel functions, Constant Average Power, Transmission bandwidth of FM Wave - Generation of FM Signal- Armstrong Method, Direct method- Reactance Modulator, Detection of FM Signal: Balanced slope detector, Phase locked loop, Comparison of FM and AM., Concept of Pre-emphasis and de-emphasis.

UNIT - III

Transmitters: Classification of Transmitters, AM Transmitters, FM Transmitters

Receivers: Radio Receiver - Receiver Types - Tuned radio frequency receiver, Superhetrodyne receiver, RF section and Characteristics - Frequency changing and tracking, Intermediate frequency, Image frequency, AGC, Amplitude limiting, FM Receiver, Comparison of AM and FM Receivers.

UNIT - IV

Pulse Modulation: Types of Pulse modulation- PAM, PWM and PPM. Comparison of FDM with TDM.

Pulse Code Modulation: PCM Generation and Reconstruction, Quantization Noise, Non-Uniform Quantization and Companding, DPCM, DM and Adaptive DM, Noise in PCM and DM.

UNIT - V

Digital Modulation Techniques: ASK- Modulator, Coherent ASK Detector, FSK-Modulator and Non-Coherent FSK Detector, FSK detection using PLL BPSK- Modulator, Coherent BPSK Detection, Principles of QPSK, Differential PSK and QAM.

Baseband Transmission and Optimal Reception of Digital Signal: A Baseband Signal Receiver, Probability of Error, Optimum Receiver, ISI, Eye Diagrams.

TEXTBOOKS:

1) Analog and Digital Communications – Simon Haykin, John Wiley, 2005.

2) Electronics Communication Systems-Fundamentals through Advanced-Wayne Tomasi, 5th Edition, 2009, PHI.

3) Communication Systems-Simon Haykin, 2nd Edition.

REFERENCE BOOKS:

1) Principles of Communication Systems - Herbert Taub, Donald L Schilling, Goutam Saha, 3rd Edition, McGraw-Hill, 2008.

2) Analog and Digital Communication – K. Sam Shanmugam, Willey, 2005.

COURSE OUTCOMES:

Upon completing this course, the student will be able to

1) Analyze and Design various continuous wave Amplitude modulation and demodulation techniques.

2) Understand the concept of Angle modulation and demodulation, and the effect of noise on it.

3) Attain the knowledge about the functioning of different AM, FM Transmitters and Receivers.

4) Analyze and design the various Pulse Modulation Techniques (Analog and Digital Pulse modulation)

5) Understand the concepts of Digital Modulation Technique, Baseband transmission and Optimum Receiver.