

Communication Systems (GE)

Credits: Theory-03

Theory Lectures: 45h

Course Learning Objectives

- To introduce various continuous wave modulation techniques used in communication systems and analyse their comparative performance.
- To understand basics of pulse analog and digital modulation techniques.

Course Learning Outcomes

At the end of this course, Students will be able to

CO1: Understand the fundamentals of a communication system

CO2: Analyse various continuous wave modulation schemes

CO3: Distinguish between various CW modulation schemes

CO4: Understand the principles of sampling and pulse communication systems

Prerequisite: Basic knowledge of electronic circuits

L-T-P: 3-0-1

Syllabus Contents

Unit-I

(10 Lectures)

Introduction: Block diagram of an electronic communication system, Electromagnetic spectrum- band designations and applications, Need for modulation, Concept of channels and base-band signals.

Basic introduction to external and internal noise, Signal to noise ratio.

Unit-II

(12 Lectures)

Amplitude Modulation: Modulation index and frequency spectrum, Power Relations in AM. Generation of AM using diode balanced modulator, Demodulation of AM using envelope detector, Concept of double side band suppressed carrier, Single side band suppressed carrier, pilot carrier modulation, Vestigial side band modulation.

Block diagrams of AM transmitter and receiver.

Unit-III**(11 Lectures)**

Angle modulation: Frequency and phase modulation, Modulation index and frequency spectrum, Equivalence between FM and PM (qualitative), Generation of FM using direct and indirect methods (block diagrams), Demodulation of FM using PLL. Concept of pre-emphasis and de-emphasis. Comparison between AM, FM and PM.

Block diagrams of FM transmitter and receiver.

Unit -IV**(12 Lectures)**

Pulse Analog Modulation: Sampling theorem, Aliasing and aperture Effect, Pulse amplitude modulation, Pulse width modulation, Pulse position modulation, Generation and detection techniques for PAM, PWM and PPM.

Pulse Code Modulation: Need for digital transmission, Block diagram of a PCM system, Uniform and non-uniform quantization, Quantization noise, Line coding.

References/Suggested Reading:

1. Electronic Communication Systems- G. Kennedy and B. Davis.
2. Principles of Electronic Communication Systems- H. Taub and D. Schilling.
3. Electronic Communication Systems- W. Tomasi.
4. Principles of Electronic Communication Systems- L. E. Frenzel
5. Communication Systems (Analog and Digital)- R. P. Singh and S. D. Sapre

Communication Systems Lab

Credits: 01

Lectures: 30h

Course Learning Outcomes

At the end of this course, Students will be able to

- CO1 Understand CW modulation methods
- CO2 Demodulate CW modulated waves
- CO3 Understand Pulse analog and digital modulation techniques
- CO4 Simulate various modulation techniques

Syllabus Contents

The practical can be performed on hardware or any simulation software.

1. Study of Amplitude Modulation.
2. Study of Frequency Modulation.
3. Study of AM Demodulation
4. Study of FM Demodulation
5. Study of Pulse Amplitude Modulation
6. Study of Pulse Width Modulation
7. Study of Pulse Position Modulation.
8. Study of Pulse Code Modulation