

COMMUNICATION SYSTEMS

Course Objective

The course is designed to cover the fundamentals, principles, concepts, and techniques of analog communication systems like various modulation techniques, data transmission, communication technologies, time-domain and frequency domain multiplexing technique and noise analysis.

Syllabus

Frequency domain representation of signal: Fourier transform and its properties, condition of existence, Fourier transform of impulse, step, signum, cosine, sine, gate pulse, constant, properties of impulse function. Convolution theorem (time & frequency), correlation(auto & cross), energy & power spectral density.

AM modulation: Block diagram of a communication system, need of modulation, types of modulations techniques, Amplitude modulation, Equation and its frequency domain representation, Bandwidth, Power requirement, efficiency. AM suppressed carrier(DSB-SC, SSB-SC, VSB-SC) Power requirement, efficiency waveform equation and frequency domain representation, Generation of AM, DSB-SC, SSB-SC, VSB-SC & its detection, synchronous generation & detection & errors.

AM transmitter & receiver: Tuned radio receiver & super heterodyne, limitation of TRF, IF frequency, image signal rejection, selectivity, sensitivity and fidelity, Noise in AM, FM

Angle modulation: Types of angle modulation, narrowband FM, wideband FM, its frequency spectrum, transmission BW, methods of generation (Direct & Indirect), detection of FM (discriminators: balanced, phase shift and PLL detector), pre emphasis and de-emphasis.

FM transmitter & receiver: Block diagram of FM transmitter & receiver, AGC, AVC, AFC, **Noise:** Classification of noise, Sources of noise, Noise figure and Noise temperature, Noise bandwidth, Noise figure measurement, Noise in analog modulation, Figure of merit for various AM and FM, effect of noise on AM & FM receivers.

Course Outcomes

Students who are successful in this class will demonstrate at least the abilities to:

1. Solve communication engineering Problems using the knowledge of time domain & frequency domain.
2. Analyze various analog modulation schemes for communication systems.
3. Analyze and compare the noise performance of various analog communication systems.
4. Understand the basic of digital transmission system.

TEXT BOOKS

1. Simon Haykins, Communication System, John Wiley
2. Singh & Sapre, Communication System, TMH
3. <http://www.nptelvideos.in/2012/11/communication-engineering.html>

REFERENCES

1. B.P. Lathi, Modern Digital and analog communication system; TMH
2. Singhal, analog and Digital communication, TMH
3. Rao, Analog communication, TMH
4. P K Ghose, principal of communication of analog and digital, universities press.
5. Taub & Shilling, Communication System, TMH
6. Hsu; Analog and digital communication(Schaum); TMH
7. Proakis fundamental of communication system. (Pearson edition).

List of experiment

1. To analyze characteristics of AM modulator & Demodulators.
2. To analyze characteristics of FM modulators & Demodulators.
3. To analyze characteristics of super heterodyne receivers.
4. To analyze characteristics of FM receivers.
5. To construct and verify pre emphasis and de-emphasis and plot the wave forms.
6. To analyze characteristics of Automatic volume control and Automatic frequency control.
7. To construct frequency multiplier circuit and to observe the waveform.
8. To design and analyze characteristics of FM modulator and AM Demodulator using PLL.