

ANALOG & DIGITAL COMMUNICATION

Objective: To familiarize students with the fundamentals of analog and digital communication systems and provide students with tools for communication signal analysis. The students familiarize with various techniques for amplitude modulation and demodulation of analog signals.

Signal Analysis: Time domain and frequency domain representation of signal, Fourier Transform and its properties, Transform of Gate, Periodic gate, Impulse periodic impulse sine and cosine wave, Concept of energy density and power, Power density of periodic.

Amplitude Modulation: Introduction of modulations techniques and its applications, Amplitude modulation, Equation and its frequency domain representation, Bandwidth, Power distribution. AM suppressed carrier waveform equation and frequency domain representation Generation (Balance/Chopper modulator) and synchronous detection technique, errors in synchronous detection. Introduction to SSB and VSB.

Angle Modulation

Modulation equation and their relative phase and frequency deviations, modulation index frequency spectrum, NBFM and WBFM, Bandwidth comparison of modulation techniques.

Signal Sampling & Analog Pulse Communication

Sampling of signal, sampling theorem for low pass and Band pass signal, PAM, TDM. Channel Bandwidth for PAM-TDM signal, Type of sampling instantaneous (Natural and Flat Top), Aperture effect, PPM, PDM.

Digital Communication

Digital signal Quantization, Quantization error, PCM, S/N Ratio, Companding, Data Rate, Baud Rate, Bit Rate, Multiplexed PCM signal, (DPCM), DM, ADM).

Digital modulations techniques, ASK, BPSK, DPSK, offset and non-offset QPSK, M-Ary PSK, BFSK, M-Ary FSK, QAM).

References:

1. Singh & Sapre, Communication System, TMH
2. B.P. Lathi & Zhi Ding, Modern Digital and Analog Communication System, 4th Edition, Oxford University Press.
3. Taub & Shilling, Communication System, TMH
4. George Kennedy & Davis, Electronic Communication System, 4th Edition, TMH.
5. Abhay Gandhi, Analog & Digital Communication: Theory & Lab Work, Cengage Learning, India.

List of Experiments (Expandable)

1. Study of sampling process and signal reconstruction and aliasing.
2. Study of PAM PPM and PDM
3. Study of PCM transmitter and receiver.
4. Time division multiplexing (TDM) and De multiplexing
5. Study of ASK PSK and FSK transmitter and receiver.
6. Study of AM modulation and Demodulation techniques (Transmitter and Receiver) Calculate of parameters
7. Study of FM modulation and demodulation (Transmitter and Receiver) & Calculation of parameters
8. To construct and verify pre emphasis and de-emphasis and plot the wave forms.
9. Study of super hetrodyne receiver and characteristics of ratio radio receiver.
10. To construct frequency multiplier circuit and to observe the waveform
11. Study of AVC and AFC.