

EC405ES: ANALOG COMMUNICATIONS

B.Tech. II Year II Sem.

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Course Objectives:

- To develop ability to analyze system requirements of analog communication systems.
- To understand the need for modulation
- To understand the generation, detection of various analog modulation techniques and also perform the mathematical analysis associated with these techniques.
- To acquire knowledge to analyze the noise performance of analog modulation techniques.
- To acquire theoretical knowledge of each block in AM and FM receivers.
- To understand the pulse modulation techniques.

Course Outcomes:

- Able to analyze and design various modulation and demodulation analog systems.
- Understand the characteristics of noise present in analog systems.
- Study of signal to Noise Ratio (SNR) performance, of various Analog Communication systems.
- Analyze and design the various Pulse Modulation Systems.
- Understand the concepts of Multiplexing: Time Division Multiplexing (TDM) and Frequency Division Multiplexing (FDM).

UNIT - I

Amplitude Modulation: Introduction to communication system, Need for modulation, Frequency Division Multiplexing , Amplitude Modulation, Definition, Time domain and frequency domain description, single tone modulation, power relations in AM waves, Generation of AM waves, square law Modulator, Switching modulator, Detection of AM Waves; Square law detector, Envelope detector, Double side band suppressed carrier modulators, time domain and frequency domain description, Generation of DSBSC Waves, Balanced Modulators, Ring Modulator, Coherent detection of DSB-SC Modulated waves, COSTAS Loop.

UNIT - II

SSB Modulation: Introduction to Hilbert Transform, Frequency domain description, Frequency discrimination method for generation of AM SSB Modulated Wave, Time domain description, Phase discrimination method for generating AM SSB Modulated waves. Demodulation of SSB Waves, Vestigial side band modulation: Frequency description, Generation of VSB Modulated wave, Time domain description, Envelope detection of a VSB Wave pulse Carrier, Comparison of AM Techniques, Applications of different AM Systems.

UNIT - III

Angle Modulation: Basic concepts, Frequency Modulation: Single tone frequency modulation, Spectrum Analysis of Sinusoidal FM Wave, Narrow band FM, Wide band FM, Constant Average Power, Transmission bandwidth of FM Wave - Generation of FM Waves, Direct FM, Detection of FM Waves: Balanced Frequency discriminator, Zero crossing detector, Phase locked loop, Comparison of FM and AM.

UNIT - IV

Noise: Resistive Noise Source (Thermal), Arbitrary Noise Sources, Effective Noise Temperature, Average Noise Figures, Average Noise Figure of cascaded networks, Narrow Band noise, Quadrature representation of narrow band noise, & its properties

Noise in Analog communication System, Noise in DSB and SSB System Noise in AM System, Noise in Angle Modulation System, Threshold effect in Angle Modulation System, Pre-emphasis and de-emphasis.

UNIT - V

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

PULSE MODULATION: Types of Pulse modulation, PAM (Single polarity, double polarity) PWM: Generation and demodulation of PWM, PPM, Generation and demodulation of PPM, Time Division Multiplexing.

TEXTBOOKS:

1. Communication Systems by Simon Haykins John Wiley & Sons, 4th Edition.
2. Electronics & Communication System – George Kennedy and Bernard Davis, McGraw Hill Education 2004.

REFERENCES:

1. Communication theory, thomas, 2 edition, McGraw-Hill Education
2. Communication Systems, 2E, R. P. Singh, S. D. Sapre, McGraw-Hill Education, 2008.
3. Analog and Digital Communication – K. Sam Shanmugam, Willey, 2005
4. Electronics Communication Systems- Wayne Tomasi, 6th Edition, Person 2009