

2/4 B.Tech - FOURTH SEMESTER

EC4T5

Analog Communications

Credits: 4

Lecture: 3 periods/week

Internal assessment: 30 marks

Tutorial: 1 period /week

Semester end examination: 70 marks

Course Objectives:

- To study various Amplitude modulation and demodulation systems.
- To study various Angle modulation and demodulation systems.
- To understand depth analysis in noise performance of various receivers.
- To analyse various pulse modulation and demodulation systems.

Learning Outcomes:

At the end of the course, students are able to understand and analyze the

- The design of various AM modulation and demodulation techniques
- Design of angle modulation and demodulation techniques.
- Impact of noise on analog modulated signals.
- Performance of various transmitters and receivers
- Performance of Pulse modulation systems.

UNIT-I

AMPLITUDE MODULATION SYSTEMS - I: Block diagram of communication system, Need for modulation, Types of modulation, Amplitude Modulation: Time domain and frequency domain description of AM, single tone modulation, power relations in AM waves, Generation of AM waves: square law Modulator, Switching modulator. Demodulation of AM waves: Square law detector, Envelope detector. Frequency division multiplexing.

UNIT-II

AMPLITUDE MODULATION SYSTEMS - II: DSB Modulation: Double side band suppressed carrier modulation, time domain and frequency domain description, Generation of DSBSC Waves: Balanced Modulator, Ring Modulator, Coherent detection of DSB-SC Modulated waves, COSTAS Loop, Quadrature carrier multiplexing. **SSB and VSB Modulation:** Time domain and Frequency domain description of SSB modulated waves, Generation of SSB waves, Demodulation of SSB waves. Time domain and frequency domain description of VSB modulated waves, Generation of VSB Modulated wave, Envelope detection of a VSB Wave pulse Carrier, Comparison of AM techniques.

UNIT-III

ANGLE MODULATION AND DEMODULATION: Basic concepts of Phase and Frequency Modulation, Single tone frequency modulation, Narrow band FM, Wide band FM, Generation of FM waves: Indirect FM, Direct FM. Balanced Frequency discriminator, Foster-Seeley Discriminator, Ratio detector, Zero crossing detector, Phase locked loop (First Order).

UNIT-IV

RECEIVERS: AM and FM Radio broadcasting: AM Receivers and FM Receivers. AM Receiver model. **NOISE IN ANALOG MODULATION SYSTEMS:** Noise in DSB and SSB system, Signal to Noise Ratios for Coherent Reception, Noise in AM receivers using Envelope Detection, FM receiver model, Noise in FM reception, Threshold Effect, Pre-emphasis and De-emphasis in FM.

UNIT-V

PULSE MODULATION: Time Division Multiplexing, Types of Pulse modulation, Generation & Demodulation of Pulse Amplitude Modulation, Pulse Width Modulation and Pulse Position Modulation, Comparison between TDM and FDM.

Learning Resources

Text Books:

1. Introduction to Analog and Digital Communication System-Simon Haykin , John Wiley and Sons,3rd Ed.,2009.
2. Fundamentals of Communication Systems - John G. Proakis, Masoud Salehi, PEARSON, 2nd Ed., 2013

References:

1. Principles of Communication Systems – H Taub & D. Schilling, Gautam Sahe,TMH, 3rd Ed.,2007
2. Analog and Digital Communication System-Sam Shanmugam, John Wiley and Sons,3rd Edition,2009