19EC211 ANALOG COMMUNICATIONS

Hours Per Week :

L	T	P	C
2	-	2	3

PREREQUISITE COURSE: Signals and Systems.

COURSE DESCRIPTION AND OBJECTIVES:

This course deals with the fundamentals of analog communications - amplitude modulation and demodulation, frequency modulation and demodulation, phase modulation and demodulation. The objective of this course is to enable the students to understand the basic mathematical concepts of communications in both time domain and frequency domain.

COURSE OUTCOMES:

Upon completion of the course, the student will be able to achieve the following outcomes.

COs	Course Outcomes
1	Understand and compare different amplitude modulation techniques.
2	Analyze performance of different types of angle modulation techniques for a given set of parameters.
3	Analyze and design the transmitter and receiver systems required for different modulation types.
4	CalculateSNR in different modulation techniques.
5	Simulate and conduct experiments using hardware on different types of Analog communication subsystems.

SKILLS:

✓   *Identify the need for modulation and choice of modulation.*

✓   *Select the frequency bands of AM/FM/T.V/Mobile/Satellite.*

✓   *Identify the Tx/Rx type required for a given application.*

✓   *Select base band signal, carrier and modulated signals in a given application.*

✓   *Identify inherent or interference noise and classify.*
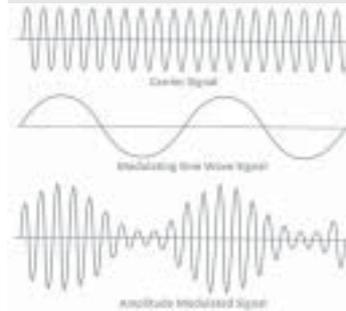
UNIT - I **L-7**

AMPLITUDE MODULATION: Introduction to communication system, Need for modulation, Frequency division multiplexing, Amplitude modulation - time domain and frequency domain description, single tone modulation, power relations in AM waves, square-law modulator, envelope detector.

UNIT - II **L-7**

DSB-SC MODULATION: Time domain and Frequency domain description, Ring modulator, Coherent detection of DSB-SC waves.
SSB MODULATION: Frequency domain description, Phase discrimination method, Coherent detection.
VSB MODULATION: Frequency domain description, Generation and Detection of VSB waves, Comparison of AM techniques.

UNIT - III **L-7**

ANGLE MODULATION: Basic concepts, Phase modulation, Frequency modulation - single tone modulation, spectrum analysis of sinusoidal FM wave, narrowband FM and wideband FM, transmission bandwidth of FM, direct method for FM generation, detection of FM waves using phase locked loop.

UNIT - IV **L-4**

TRANSMITTERS: AM Transmitters, Variable reactance type FM Transmitter.
RECEIVERS: Receiver characteristics, Tuned radio frequency receiver, Super-heterodyne receiver.

UNIT - V **L-5**

NOISE: Noise in DSB-SC and SSB system using coherent detection, Noise in amplitude modulation systems, Noise in frequency modulation systems, Pre-emphasis & De-emphasis.

LABORATORY EXPERIMENTS

LIST OF EXPERIMENTS   **TOTAL HOURS: 30**

1. Amplitude Modulation and Demodulation.*

2. DSB-SC Modulation and Demodulation.*

3. SSB-SC Modulation and Demodulation.*

4. Frequency Modulation and Demodulation*.

5. Pre-Emphasis and De-Emphasis.

6. Phase Locked Loop.

7. Design of Mixer.

8. AGC Characteristics.

9. Frequency Division Multiplexing.

* To be performed both in hardware and software (Simulink).

TEXT BOOKS:

1. Simon Haykins, "Communication Systems", 2nd edition, Wiley, 2009.

2. G.K.Mithal, "Radio Engineering Principles of Communication systems", 12th edition, Khanna Publishers, 2013.

REFERENCE BOOKS:

1. H Taub, D.L.Schlling and Goutam Saha, "Principles of Communication Systems", 3rd edition, TMH, 2008.

2. B.P.Lathi, "Modern Digital and Analog Communication Systems", 4th edition, Oxford University Press, 2011.

3   Wayne Tomasi, "Electronics Communication Systems", 5th edition, Pearson, 2004.

4. George Kennedy and Bernard Davis, "Electronic Communication System", 4th edition, TMH, 2009.