

**II B.Tech – II Semester  
(17EC404) ANALOG COMMUNICATIONS**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	3

**Pre-Requisites: None**

**Course Objectives:**

- Discuss fundamentals of analog communication systems
- Explain various modulation and demodulation techniques of analog signals
- Able to Distinguish the merits of various analog modulation and Demodulation methods
- Explain basic techniques for generating and demodulating various pulse modulated signals
- Explain Analog modulation schemes w.r.t noise
- Able to classify and understand various functional blocks of communication transmitters and receivers

**UNIT-I: AMPLITUDE MODULATION**

Introduction to Communication system, Need for modulation, Frequency Division Multiplexing. Amplitude Modulation – Time domain and Frequency domain description, single tone and multi-tone modulation, spectral analysis, power and bandwidth relations, AM Generation: Square law modulator, switching modulator. AM Detection: Square law detector, Envelope detector.

**UNIT-II: DSB and SSB MODULATION**

**DSB-SC MODULATION:** Spectral analysis, Generation: Balanced Modulator, Ring Modulator. Detection: Coherent detection, Costas Loop. Time and Frequency domain description, power and bandwidth relations, SSB Generation: Frequency and Phase discrimination method. Demodulation: Synchronous detection, low level and high level modulation. Vestigial Side Band Modulation and Detection : Frequency description , Time Domain Description, VSB Generation, Envelope detection, Comparison of AM Techniques, Applications of different AM Systems.

**UNIT-III: ANGLE MODULATION**

Phase and Frequency Modulation: Spectral Analysis of Sinusoidal FM and PM signals, Narrow band FM, Wide band FM, Transmission bandwidth, FM Transmitters-Direct and Armstrong type FM Modulators., FM Demodulators: Balanced Frequency discriminator, Zero crossing detector, Phase Locked Loop, Comparison of PM, FM & AM.

**UNIT-IV: PULSE MODULATION**

Sampling theorem, sampling techniques, Time Division Multiplexing, Types of Pulse modulation, PAM – Natural sampled and Flat Top sampled, PWM and PPM Generation and Demodulation.

**UNIT-V: NOISE**

Noise sources, Thermal noise, Noise Figure and Noise Temperature, Average Noise Figure and Effective Noise Temperature of cascaded networks, Noise in communication Systems: Noise in AM System, Noise in DSB and SSB Systems, Noise in Angle Modulation Systems, Pre- emphasis & de-emphasis.

**UNIT- VI: COMMUNICATION TRANSMITTERS & RECEIVERS**

AM Transmitters: Radio Transmitter - Classification of Transmitter, AM Transmitter, Effect of feedback on performance of AM Transmitter, FM Transmitters: Variable reactance type and phase modulated FM Transmitter, frequency stability in FM Transmitter.

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. Communication Receivers, extensions of super-heterodyne principle.

### Course Outcomes:

After successful completion of the course, the students can be able to:

S. No	Course Outcome	BTL
1.	Understand the need for modulation, analysis of Amplitude modulation	L1
2.	Analysis of DSB-SC, SSB-SC Modulation schemes and spectral characteristics	L3
3.	Performance analysis of various parameters about Angle a modulation and its spectral characteristics	L3
4.	Classification and implementation techniques of various transmitters and receivers.	L2
5.	Noise Performance analysis various modulation schemes	L4
6.	Understand and Analysis of sampling techniques and different pulse modulation schemes	L1

### Correlation of COs with POs & PSOs:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO 1	3	1	-	-	3	-	-	-	2	3	-	1	2	2
CO 2	3	3	-	-	3	-	-	-	2	3	-	1	3	2
CO 3	3	2	-	-	3	-	-	-	2	3	-	1	3	3
CO 4	1	1	-	-	-	-	-	-	-	-	-	-	3	-
CO 5	3	2	-	-	2	-	-	-	2	3	-	1	3	2
CO 6	3	2	-	-	1	-	-	-	-	-	-	-	3	1

### Text Books

1. Principles of Communication Systems – H Taub & D. Schilling, Gautam Sahe, TMH, 2007 3<sup>rd</sup> Edition.
2. Communication Systems – B.P. Lathi, BS Publication, 2006.

### Reference Books:

1. Principles of Communication Systems - Simon Haykin, John Wiley, 2<sup>nd</sup> Ed.
2. Electronics & Communication System – George Kennedy and Bernard Davis, TMH 2004.
3. Communication Systems– R.P. Singh, SP Sapre, Second Edition TMH, 2007.
4. Electronic Communication systems – Tomasi, Pearson.