II Year II Semester	**L**	**T**	**P**	**C**
Code: 17EC404	**3**	**1**	**0**	**3**

ANALOG COMMUNICATIONS

Course Objectives:

At the Students undergoing this course, are expected to

1. Discuss fundamentals of analog communication systems
2. Explain various modulation and demodulation techniques of analog signals
3. Able to Distinguish the merits of various analog modulation and Demodulation methods
4. Explain basic techniques for generating and demodulating various pulse modulated signals
5. Explain Analog modulation schemes w.r.t noise
6. 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 hetrodyne 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.

TEXT BOOKS:

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

REFERENCES:

1. Principles of Communication Systems - Simon Haykin, John Wiley, 2nd 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.

Course Outcomes:

After undergoing the course, students will be able to

1. Understand the need for modulation, analysis of Amplitude modulation
2. Analysis of DSB-SC, SSB-SC Modulation schemes and spectral characterestics
3. Performance analysis of various parameters about Angle modulation and its spectral characteristics
4. Understand and Analysis of sampling techniques and different pulse modulation schemes
5. Noise Performance analysis various modulation schemes
6. Classification and implementation techniques of various transmitters and receivers.