

II Year - II Semester

L	T	P	C
4	0	0	3

## ANALOG COMMUNICATIONS

### 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.

### UNIT II

**DSB & SSB MODULATION** : 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. 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 & AM.

### UNIT IV

**TRANSMITTERS & RECEIVERS: Radio Transmitter** - Classification of Transmitter, AM Transmitter, Effect of feedback on performance of AM Transmitter, FM Transmitter – Variable reactance type and phase modulated FM Transmitter, frequency stability in FM Transmitter. **Radio Receiver** - Receiver Types - Tuned radio frequency receiver, Superhetrodyne receiver, RF section and Characteristics - Frequency changing and tracking, Intermediate frequency, AGC, FM Receiver, Comparison with AM Receiver, Amplitude limiting. Communication Receivers, extensions of superheterodyne principle and additional circuits.

### UNIT V

**NOISE** : Review of noise and noise sources, noise figure, Noise in Analog communication Systems, Noise in DSB& SSB System, Noise in AM System, Noise in Angle Modulation Systems, Threshold effect in Angle Modulation System, Pre-emphasis & de-emphasis

### UNIT VI

**PULSE MODULATION** : Time Division Multiplexing,, Types of Pulse modulation, PAM (Single polarity, double polarity) PWM: Generation & demodulation of PWM, PPM, Generation and demodulation of PPM, TDM Vs FDM

**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.

**REFERENCES:**

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. Fundamentals of Communication Systems - John G. Proakis, Masond, Salehi PEA, 2006.
5. Electronic Communication systems – Tomasi, Pearson.

**Course Objectives:**

Students undergoing this course, are expected to

1. Familiarize with the fundamentals of analog communication systems
2. Familiarize with various techniques for analog modulation and demodulation of signals
3. Distinguish the figure of merits of various analog modulation methods
4. Develop the ability to classify and understand various functional blocks of radio transmitters and receivers
5. Familiarize with basic techniques for generating and demodulating various pulse modulated signals

**Course Outcomes:**

After undergoing the course, students will be able to

1. Differentiate various Analog modulation and demodulation schemes and their spectral characteristics
2. Analyze noise characteristics of various analog modulation methods
3. Analyze various functional blocks of radio transmitters and receivers
4. Design simple analog systems for various modulation techniques.