BVM ENGINEERING COLLEGE [AN AUTONOMOUS INSTITUTION]

2EC13: ANALOG COMMUNICATION
CREDITS - 3 (LTP:3,0,0)

Course Objective:
Understanding electronic communications systems in analog form from deterministic approach. Design and Analysis of analog communications systems.

Teaching and Assessment Scheme:

Teaching Scheme (Hours per week)			Credits	Assessment Scheme				Total Marks
				Theory Marks		Practical Marks		
L	T	P	C	ESE	CE	ESE	CE	100
3	0	0	3	60	40	00	00	

Course Contents:

Unit No.	Topics	Teaching Hours
1	**Introduction to communication systems :** Understand the Communication system, Analog and digital Messages, Channel effect, Modulation and detection, Bandwidth of different information signals, Historical review of telecommunication, Applications, Review of signal and systems.	4
2	**Analog Signal Transmission :** A periodic signal representation by Fourier integral, Transform of some useful function, Some properties of the Fourier transform, Signal transmission through a linear system, Ideal and practical filters, Signal distortion over a communication channel, Signal energy and energy spectral density, Signal power and power spectral density.	6
3	**Noise :** Introduction, thermal noise, Shot noise, Partition Noise, Low frequency noise, Burst noise, a noise, High frequency noise, BJT and FET noises, Equivalent input noise generators, Signal to noise ratio (SNR), SNR of Tandem connection, Noise factor and noise figure, Amplifier input noise in terms of noise figure, Noise factor in cascaded amplifiers, Noise factor and equivalent input noise generators, noise factor of a lossy network, Noise temperature, Measurement of noise temperature and noise factor, narrow-band band pass noise.	8
4	**Amplitude Modulations and demodulations :** Concept of modulation, Mathematical representation of sinusoidal Amplitude modulated signals in time and frequency domain- Double sideband Full carrier (DSBFC) , Double sideband suppressed carrier(DSBSC) and single sideband suppressed carrier modulations(SSBSC), Vestigial Sideband (VSB) modulation and Quadrature amplitude modulation(QAM), power and bandwidth calculations for DSBFC, DSBSC, SSBSC, VSB and QAM modulations, Non sinusoidal AM – effective modulation index, Effective voltage and current for sinusoidal and non-sinusoidal AM, AM generation: FET balanced modulator and IC balanced modulator circuits, Diode ring	12

Unit No.	Topics	Teaching Hours
	modulator, SSB generation: balanced modulator-filter method, phasing method and the third method, AM detection: peak (envelope detector), synchronous detectors, square law detectors, Functions of radio receivers, working of super heterodyne radio receivers, AM receivers.	
5	**Angle Modulations and demodulations:** Concept of instantaneous frequency and angle modulation, sinusoidal FM and its time domain representation, spectral components of angle modulated signals, power in sinusoidal FM and modulation index, Carson's rule, equivalence between Frequency modulation(FM) and Phase modulation(PM), Angle modulator circuits, FM transmitters, Armstrong method of FM generation, Fm stereo broadcast, FM detection: Basic slope detector, Foster-Seeley discriminator, ratio detector, PLL detector and Quadrature detector, Concept of Amplitude limiter, Pre-emphasis and de-emphasis circuits, Interference in angle modulated system, sensitivity and gain, image rejection, spurious responses, Adjacent channel selectivity, Automatic gain control, FM receivers.	11
6	**Pulse Modulation:** Types of Pulse modulation, PAM (Single polarity, double polarity) PWM: Generation and demodulation of PWM, PPM, Generation and demodulation of PPM.	4
	Total	**45**

List of References:

1. B.P.Lathi, Zhi Ding, "*Modern Analog and Digital communication system*", 4th Edition, Oxford University press, 2010.
2. Simon Haykins,"*Communication Systems*",John Wiley & Sons, 4th Edition.
3. Dennis Roddy, John Coolen, "*Electronic Communication*", Fourth Edition, Prentice Hall, 2005.
4. John G. Prokis, Masoud Salehi, "*Fundamentals of Communication Systems*", Third Impression Pearson Education India, 2008.
5. George Kennedy, Bernard Davis, S.R.M. Prasanna, "*Electronic Communication Systems*", Tata McGraw Hill Education Limited, 5th Edition, 2011.
6. Sanjay Sharma, "Analog Communication Systems", Second Edition, S K Kataria & Sons,2007.
7. Frenzel Louis, "*Communication Electronics - Principles and Applications*", Tata McGraw-Hill Education,3rd Edition,1994.

Course Outcomes (COs):

By learning this course students will be able to …

1. Understand the basics of communication system.
2. Evaluate the Fourier transform to analyse various signals and observe their frequency domain contents.
3. Explain different types of noise related to communication systems.
4. Demonstrate Amplitude modulation and demodulation techniques.
5. Implement Angle modulation and demodulation techniques.
6. Classify various types of pulse modulation techniques.