ANALOG COMMUNICATIONS

(Core Subject)

Course Code:	10B11EC413	**Semester:**	4th Semester, B. Tech (ECE)
Credits:	4	**Contact Hours:**	L-3, T-1, P-0

Course Objectives

1. To introduce the concepts of analogue communication systems.
2. To equip students with various issues related to analogue communication such as modulation, demodulation, transmitters and receivers and noise performance.

Course Outcomes

This course provides the knowledge of analog and digital communication system analysis and design. After study through lectures and assignments, students will be able to

1. Gain the knowledge of components of analogue communication system.
2. To analyze various methods of baseband/band pass Analogue transmission and detection.
3. Analyze and allocate performance objectives to components of an analogue communication system and to design analogue communication systems.
4. To evaluate the performance of analogue communications in the presence of noise.

Course Contents

Unit	**Topics**	**References (chapter number, page no. etc)**	**Lectures**
1.	Introduction: Typical communication system Analog and Digital communication.	Simon Haykin chap-1	1
2.	Periodic signal and trigonometric Fourier series Exponential Fourier series Parsevel's Theorem for Fourier series Fourier transform and its properties Energy and power Special functions.	Simon Haykin chap-2	2
3.	RC circuits, LC circuits and Band-Pass filter, Operational Amplifiers.		Self Study
4.	Signal transmission through LTI system, Distortion less LTI system Filtering and Signal distortion: Linear distortion and equalization, Ideal low pass filters, Band-pass Transmission, phase delay and group delay, nonlinear distortion.	Simon Haykin chap-2	3
5.	Base-band Communication Amplitude modulation: DSB-SC Demodulation of AM-DSB-SC Coherent Detection Modulation circuits: Non linear circuits and Bridge	Simon Haykin chap-3	10

	Modulator Demodulation circuits Amplitude modulation DSB-with carrier Single sideband modulation. Circuits to modulate SSB signal Vestigial sideband modulation Comparison of amplitude modulation techniques. Frequency translation Frequency division multiplexing.		
6.	Angle modulation Sinusoidal message signal (FM) Narrow band FM Wide band FM Demodulation of FM signal Foster-seeley discriminator Phase lock loop Super-heterodyne receiver Non liner Effect in FM signal Interference in angle modulated signal Capture effect.	Simon Haykin chap-4	10
7.	Digital communication basic Sampling Fourier transform of a pulse train Fourier transform of a sampled signal Anti-aliasing filter Pulse amplitude modulation Time division multiplexing Pulse width modulation Pulse position modulation.	Simon Haykin chap-5	4
8.	Axioms of probability Equally probable events and union of two events Complement of an event Probability of union of events Conditional probability and independent events.	Simon Haykin chap-8	Self Study
9.	Random variable Cumulative distribution function Uniformly distributed random variable Gaussian random variable Statistical average Several random variable Random process stationary Power spectral density Transmission of random process through a linear systems White noise Narrow band noise.	Simon Haykin chap-8	5
10.	Signal-to-noise ratios AM receiver model Signal-to-noise ratios for coherent reception Noise in AM receiver using Envelop Detection FM receiver model 6 Noise in FM reception FM threshold effect Pre-emphases and emphasis in FM.	Simon Haykin chap-9	6
		Total Number of Lectures	**41**

Evaluation Scheme

1. Test 1 : 15 marks
2. Test 2 : 25 marks

3. Test 3 : 35 marks
4. **Internal Assessment** : 25 marks
    - 10 Marks : Class performance, Tutorials & Assignments
    - 10 Marks : Quizzes
    - 5 marks : Attendance

Text Books

1. Simon Haykin, “An introduction to analog and digital communications”, John Wiley & Sons.
2. B.P. Lathi, “Modern Digital and Analog Communication Systems”, Oxford.

Reference Books

1. Simon Haykin, “Communication systems”, John Wiley & Sons, 2008.
2. Crilly Carlson, “Communication Systems”, McGrawHill.
3. Schilling Taub, “Principles of Communication Systems”, McGrawHill.
4. George Kennedy, “Electronic communication systems”, Tata Mcgraw Hill.