

Summer FDP: Fundamental of Analog & Digital Communication Systems (13-22May,2017)

Course Topics:

S No	Module Name	Topics
1	Review of Fundamental Concepts and Mathematical preliminaries (10 hours) Module Co-ordinator: Prof. Ratnajit Bhattacharjee	Elements of an electrical communication system; Characteristics of communication channel and their mathematical modeling; Signal models: deterministic and random; signal classification; Convolution Integral and response of LTI system; Fourier series representation, Parseval's theorem; Fourier transform; Hilbert transform; Random Process: mean, correlation and covariance; stationary and ergodic processes; power spectral density; Gaussian Process.
2	Basic digital modulation schemes and signaling over AWGN channels (12 Hours) Module Co-ordinator: Prof. Vishwanath Sinha	Overview of geometric representation of signals, Gram-Schmidt Orthogonalization procedure; Basic digital modulations schemes: Phase shift keying (PSK), amplitude shift keying (ASK), frequency shift keying (FSK) and Quadrature amplitude modulation (QAM); coherent demodulation and detection; probability of error. Basics of equivalent complex baseband representation of digitally modulated signals.
3	Analog communication systems (14 Hours) Module Co-ordinator: Dr. Vinod P	Concept of modulation and demodulation, Continuous wave (CW) modulation: amplitude modulation (AM) - double sideband (DSB); double sideband suppressed carrier (DSBSC); single sideband suppressed carrier (SSBSC) and vestigial sideband (VSB) modulation, angle modulation - phase modulation (PM) & frequency modulation (FM); narrow and wideband FM. Representation of narrowband noise; receiver model, signal to noise ratio (SNR), noise figure, noise temperature, noise in DSB-SC, SSB, AM & FM receivers, pre-emphasis and de-emphasis.
4	Pulse Modulation (10 Hours) Module Co-ordinator: Dr. V V Mani	Sampling process, sampling theorem for band limited signals; pulse amplitude modulation (PAM); pulse width modulation (PWM); pulse position modulation (PPM) ; pulse code modulation (PCM); line coding; differential pulse code modulation; delta modulation and adaptive delta modulation, Basics of time division multiplexing, noise consideration in PAM and PCM systems.
5	Hands on (circuit design, assembly and measurements) (24 Hours)	Amplitude modulation and demodulation (AM with carrier & DSBSC AM); frequency modulation and demodulation (using VCO & PLL); automatic gain control (AGC); pulse width modulation (PWM); pulse code modulation (PCM); pseudo-random (PN) sequence generation; Generation and detection of signals for binary phase shift keying

		(BPSK) and binary frequency shift keying (BFSK). BER performance of BPSK signals.
6	Pedagogy & skill development : 10 hours	

Inauguration on 13th May,2017 at 9.00 am.

Week 1 (13th to 19th May):

Lectures: 46hrs

Lab: 24 hrs

Pedagogy: 10 hrs

RB: Prof. Ratnajit Bhattacharjee Module 1:Review of Fundamental Concepts and Mathematical preliminaries.

VS: Prof. Vishwanath Sinha Module 2: Basic digital modulation schemes and signaling over AWGN channels.

VP: Dr. Vinod P Modue 3: Analog communication systems.

VV: Dr. V V Mani Module 4: Pulse Modulation.