Course Code	Course Name	Course Structure	
ITECC13/ INECC13	Analog & Digital Communication	LTP	302

COURSE OUTCOME (CO):
By the end of the course students will be able to:
CO1: Understand and remember different modulation and demodulation schemes for analog and digital communications.
CO2: Illustrate the basic knowledge of probability theory and understand the effect of Noise in communication system.
CO3: To design, implement and compare various modulation and demodulation schemes.
CO4: To select different pattern of voltage, current used to represent digital data transmitted down a transmission line.
CO5: To formulate mathematical model of a given communication system.

UNIT	COURSE CONTENT:	LECTURE NO.	PRACTICALS
Unit-I: (O8)	**INTRODUCTION:** Introduction to communication system, Communication Channels, Review of signals	01	MATLAB: 1. Introduction 2. Fourier transform definition, distortion in transmission 3. Fourier transform properties
	Time scaling and shifting of signals, Fourier transform and its properties	02-08	
	Bandpass representation of Signals, Need for modulation.	09-10	
Unit-II: (12)	**ANALOG MODULATION:** Definition, Time domain and frequency domain description- AM, DSBSC, single tone modulation	11-12	MATLAB & HARDWARE: 4. AM mod/ demod, DSBSC mod/demod 5. SSB mod/demod 6. FM mod/ demod
	Power relations in AM waves, Generation and Demodulation of AM waves, Generation and demodulation of DSBSC Waves.	13-14	
	SSB modulation and demodulation	15	
	Introduction to FM and PM, Frequency Modulation: Single tone frequency	16-17	
	Spectrum Analysis of Sinusoidal FM Wave, Narrow band FM, Wide band FM	18	
	Generation and Demodulation of FM Waves	19	
	Noise analysis of AM and DSB receivers. Noise in FM Receiver	20-22	
Unit-III: (08)	**PULSE MODULATION TECHNIQUES:** Sampling, TDM	23-24	MATLAB/ HARDWARE: 7. Sampling, reconstruction 8. PCM
	Pulse Code Modulation, Differential PCM systems (DPCM)	25-27	
	Delta modulation, adaptive Delta modulation, comparison of PCM and DM systems	28-29	
	Noise in PCM and DM systems	30	
Unit-	**BASEBAND MODULATION:** Model of digital communication systems, Gram-Schmidt	31	MATLAB:

IV: (04)	Orthogonalization, Geometric interpretation of signals		9. Matched filter receiver 10. Viva voce
	Detection of known signals in noise, probability of error, matched filter receiver, correlation receiver	32-33	
	Requirements of a line encoding format, various line encoding formats- Unipolar, Polar, Bipolar, Manchester encoding, Digital subscriber line.	34	
Unit-V: **(08)**	**DIGITAL MODULATION TECHNIQUES:** Digital Modulation formats, Coherent binary modulation techniques (BPSK, BFSK)	35-37	MATLAB/ HARDWARE 11. Observe the performance of Binary ASK signal in presence of noise. 12. Observe the performance of Binary FSK signal in presence of noise.
	Coherent quadrature modulation techniques (QPSK)	38	
	Non-Coherent binary modulation techniques (DPSK)	39	
	BER for BPSK	40	
	Huffman and Shannon Fano encoding	40-42	

Text Books	
[T1]	S. Haykin, Communication Systems, 4thEdn, John Wiley & Sons, Singapore, 2001.
[T2]	B.P. Lathi, Modern Digital & Analog Communication Systems, 3rdEdition, Oxford University Press, Chennai, 1998.
Reference Books:	
[R1]	Leon W. Couch II. Digital and Analog Communication Systems, 6thEdition, Pearson Education Inc., New Delhi, 2001.
[R2]	A Bruce Carlson, PB Crilly, JC Rutledge, Communication Systems, 4th Edition, MGH, New York, 2002.

EVALUATION SCHEME FOR CONTINUOUS ASSESSMENT:

Sr. No.	Component	Continuous Assessment	Marks
1.	TCA (15)	1 class test	5
2.		Three Assignments	5
3.		Attendance/Response in Class	5
4.	PCA (15)	1 Lab Test/Viva	5
5.		Lab Files, Attendance/Performance in Lab	1 mark per turn
6.			
7.		Total	30 marks

For any difficulties related to the course, students may contact the following:

S.No.	CCC	Name	Contact E Mail
1	Chairperson	Prof. Parul Garg	parul.garg@nsut.ac.in
2	Co-Chairperson	Prof. Harish Parthasarathy	harishp@nsit.ac.in
3	Course Instructor	Prof. Parul Garg, Prof. Harish Parthasarathy, Dr. Tarun Rawat	parul.garg@nsut.ac.in, harishp@nsit.ac.in, tarun.rawat@nsut.ac.in