

COURSE TITLE	ANALOG AND DIGITAL COMMUNICATION
COURSE CODE	01CT1552
COURSE CREDITS	3

Objective:

- 1 This course explores the fundamentals of electronic communication systems it provides the knowledge of various analog and digital modulation and demodulation techniques used in communication system. Comparison of various techniques will enable the student to select most appropriate technique for the application

Course Outcomes: After completion of this course, student will be able to:

- 1 Understand basics of analog and digital communication techniques
- 2 Learn working of AM-FM Transmitters and receivers.
- 3 Facilitate the understanding of the baseband and carrier modulation.
- 4 Understand the effect and performance of communication systems in presence of noise.
- 5 Analyse Communication System based on different Modulation & Demodulation Techniques and analyse performance

Pre-requisite of course:NA

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
3	0	0	50	30	20	0	0

Contents : Unit	Topics	Contact Hours
1	Linear Modulation: Amplitude modulation Concept of amplitude modulation, Double Sideband suppressed carrier modulation, Single side band suppressed carrier modulation, Generation of AM- Chopper circuit, Balanced modulator, Modulation by multitone modulating signal, Independent Side band, Theme example- VSB transmission of Analog and Digital Television	7
2	Angle modulation Concept of instantaneous frequency and phase modulation, sinusoidal FM and its time domain representation, spectral components of angle modulated signals, power in sinusoidal FM and modulation index, Carson's rule, Multitone wideband FM, Generation of Wideband FM from Narrow band FM , Generation of WBFM by Armstrong method	5

Contents : Unit	Topics	Contact Hours
3	Noise in communication systems Classification of noise, Signal to noise ratio (SNR), Noise factor and noise figure, Equivalent input noise generators, Noise temperature, Narrow band noise, PSD of in-phase and quadrature noise, Noise performance in AM, FM, Digital baseband and carrier communication systems, Concept of optimum threshold detection, matched filter, correlation receiver, optimum binary receiver, bit error rate (BER)	4
4	Base Band Modulation Base band system, sampling theorem, Sampling and signal reconstruction, Aliasing, Types of sampling, Quantization, PCM, Companding, DPCM, ADPCM, Delta modulation, Adaptive delta modulation, Theme Example- Digitization of video and MPEG	9
5	Digital Modulation Techniques Modulation techniques for ASK, QASK, FSK, M-ary FSK, BPSK, DPSK, QPSK, M-ary PSK, QAM, Comparison of Noise performance of various PSK and FSK systems, Theme Example- Orthogonal Frequency Division Multiplexing (OFDM)	9
6	Linear Modulation: Amplitude modulation Concept of amplitude modulation, Double Sideband suppressed carrier modulation., Single side band suppressed carrier modulation, Generation of AM- Chopper circuit, Balanced modulator, Modulation by multitone modulating signal, Independent Side band, Theme example- VSB transmission of Analog and Digital Television	8
Total Hours		42

Textbook :

- 1 Electronic Communication Systems, George Kennedy, Gregg Division, McGraw-Hill, 1977
- 2 Electronic Communications, Dennis Roddy, John Coolen, Reston Publishing Company, 1977
- 3 Communication Systems, Singh, Tata McGraw-Hill, 2012
- 4 Modern Digital and Analog Communication Systems, Bhagwandas Pannalal Lathi, Zhi Ding, Oxford University Press, 2010

References:

- 1 Principles Of Communication Systems, Principles Of Communication Systems, -, Tata McGraw-Hill Publishing Company Limited, 1991

Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery

Remember / Knowledge	Understand	Apply	Analyze	Evaluate	Higher order Thinking / Creative
10.00	25.00	25.00	20.00	10.00	10.00

Instructional Method:

- 1 The course delivery method will depend upon the requirement of the content and need of the students. The teacher in addition to the conventional teaching method (Chalk and Talk) may use any of the tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc. for effective teaching.
- 2 The internal evaluation will be done on the basis of continuous evaluation of students in the class-room

Supplementary Resources:

- 1 https://onlinecourses.nptel.ac.in/noc21_ee74/preview
- 2 <http://vlabs.iitkgp.ac.in/psac/newlabs2020/vlabiitkgpAE/>