



Course Title: Analog & Digital Communication

Course Code: to be decided later

Credit Units: 4

Level: UG

L	T	P/ S	SW/F W	TOTAL CREDIT UNITS
3	0	2	0	4

Course Objectives: The purpose of this course is to provide a thorough introduction to analog and digital communication with an in depth study of various modulation techniques and to develop the students' ability to determine the effects of receiver frequency and phase errors in synchronous modulation systems. It also provides the effect of noise on analog communication

Prerequisites:

Signal & Systems

Course Contents/Syllabus:

	Weightage (%)
Module I: Introduction Communication Systems, Modulation, Need of Modulation Process ,Bandwidth requirement, Application of Fourier Transform in communication system ,Analog versus digital communications	15%
Module II : Amplitude Modulation Amplitude modulation theory – Frequency spectrum of AM wave, Representation of AM wave,Power relation in the AM wave,Generation & detection of AM,DSB-SC,SSB-.SC,Introduction to VSB transmission.	20%
Module III: Angle Modulation Theory of Frequency and Phase Modulation: Description of the systems, mathematical representation of FM,BW calculations using Carson rule, Frequency spectrum of FM wave, Phase modulation, Narrow and Wide band FM, Generations and Demodulation of FM	20%
Module IV : Pulse Modulation	20%

Sampling, Sampling Theorem, Aliasing & Reconstruction, Pulse Amplitude, Pulse Width & Pulse Position modulation, Generation & detection of PAM, PWM & PPM, Comparison of frequency division and time division multiplexed systems.	
Module V : Pulse Digital Transmission	25%
Pulse Code modulation, DPCM, Signal to Quantization ratio, Companding, Delta Modulation, Adaptive Delta Modulation, Line Coding and its properties, Generation and Detection of ASK, FSK, PSK, Synchronization and Signaling of T1, TDM, PCM Hierarchy, T1 to T4 PCM TDM System (DS1 to DS4 Signals)	

Student Learning Outcomes:

After completing the Analog and Digital Communication course, students will be able to

1. Graduates of the programme will be able to analyze and design basic communication systems.
2. Students will be able to apply concepts and techniques from Fourier and circuit analysis to communication systems. They will develop the ability to compare and contrast the strengths and weaknesses of various communication systems.
3. By the end of the programme students will be able to compute the bandwidth and transmission power by analysing time and frequency domain spectra of signal required under various modulation schemes

Pedagogy for Course Delivery:

- Class Room Lectures, assignments, Quizzes
- Practical on the Hardware and Software setups

List of Experiments:

1. Perform an experiment for Sampling and Reconstruction of Analog Signal.
2. Perform an experiment to Generate and Demodulate AM, also calculate modulation index.
3. Perform an experiment to Generate and Demodulate FM, also calculate modulation index.
4. Perform an experiment to Generate and Demodulate PAM.
5. Perform Pulse Code modulation & Demodulation
6. Perform Time Division Multiplexing & Demultiplexing.
7. Perform an experiment to Generate and Demodulate ASK.
8. Perform an experiment to Generate and Demodulate FSK.
9. Perform an experiment to Generate and Demodulate PSK.
10. Perform an experiment to Generate and Demodulate QPSK.

Assessment/ Examination Scheme:

Theory L/T (%)	Lab/Practical/Studio (%)	End Term Examination
75%	25%	100%

Theory Assessment (L&T):

Continuous Assessment/Internal Assessment					End Examination	Term
Components (Drop down)	Mid-Term Exam	Q/HA/PR	Viva	Attendance		
Weightage (%)	10%	7%	8%	5%	70%	

Lab Assessment (L&T):

Continuous Assessment/Internal Assessment					End Examination	Term
Components (Drop down)	Performance	Lab file	Viva	Attendance		
Weightage (%)	10%	10%	5%	5%	70%	

Text & References:

- B. P. Lathi: "Modern analog & digital communication", OXFORD Publications
- Wayne Tomasi: "Electronic Communication systems", Pearson Education, 5th edition
- Simon Haykin, "Communication Systems", John Wiley & Sons, 1999, Third Edition.
- Taub and schilling, "Principles of Communication Systems" TMH
- Kennedy, "Electronic Communication Systems"TMH