Communication Systems

Code	Credit Hours
EE- 351	3-1

Course Description

This course provides a comprehensive introduction to communication systems, focusing on both analog and digital communication techniques. It begins by exploring the time and frequency domain representations of signals and systems using Fourier Transform. Students will study signal transmission through linear systems, along with modulation techniques such as AM and FM. Key concepts like sampling, quantization, A/D conversion, and digital modulation schemes (ASK, PSK, DPSK, QAM) are covered to transition from analog to digital communication. Additionally, the course introduces wireless mobile systems and analyzes the effects of noise on system performance. Finally, Shannon's Theorem and information theory are discussed, with a focus on coding techniques and the trade-off between signal-to-noise ratio and bandwidth. Practical system design and real-world applications are emphasized throughout the course.

Text Book:

1. B.R Lathi, Zhi Ding "Modern Digital and Analog Communication Systems". Oxford University Press, Fourth Edition, 2010

Reference Book:

1. John G. Proakis. Masoud Salehi. " Fundamentals of Communications", Second Edition, Prentice Hall, 2013
2. John G. Proakis, Masoud Salehi. "Digital Communications". Fifth Edition, McGraw Hill. 2008

Prerequisites

NIL

ASSESSMENT SYSTEM FOR THEORY

Quizzes	10%
Assignments	10%
Mid Terms	30%
ESE	50%

Teaching Plan

Week No	Topics	Learning Outcomes
2	Introduction to Communication System Time and frequency domain	Model of a Communication System. Time domain and frequency domain description of signals and systems by using Fourier Transform.
3-5	Transmission and Modulation	Transmission of signal though a linear system. Various modulation techniques. AM and FM.
6	**MID TERM IN WEEK 9**	
7-8	Sampling	Concepts of Sampling and quantization, A/D conversion, PCM, and Delta Modulation Digital Modulation ASK, PSK, DPSK, QAM
9	**MID TERM EXAM**	
10-16	Introduction to Wireless Mobile System	Introduction to Wireless Mobile System Noise: Sources. Spectral Density and Probability Density. Performance of Analog and Digital Systems in the presence of Noise. Evaluation of Error Probability for different Digital Modulated Signals over Noisy Channel.
17-18	Shannon’s Theorem	Elements of Information Theory and coding techniques. Shannon's Theorem. Exchange of S/N and Bandwidth
19		**End Semester Exams**