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Department of Electrical Engineering

Communication Principles (63375)

Total Credits	3

major compulsory

Prerequisites	P1 : Systems &Signal Analysis (63321) OR Systems &Signal Analysis (69230) OR System &Signal Analysis (63373)

Course Contents

Mathematical representation of message signals. Amplitude and angle modulation techniques: Amplitude modulation, double sideband, single sideband, vestigial sideband modulation, frequency modulation. Super heterodyne receivers. Phase locked loops. Frequency division multiplexing, sampling theorem, Noise in amplitude and frequency modulation system. Introduction to digital communication techniques

	Intended Learning Outcomes (ILO's)	Student Outcomes (SO's)	Contribution
1	Ability to use mathematics (Fourier transform, calculus, special mathematical functions) to analyze analog communication systems	A	15 %
2	Ability to analyze simple analog AM, FM transmitters and receivers	E	30 %
3	Ability to design simple analog AM, FM transmitters and receivers	C	25 %
4	Ability to solve analog communication problems, noise and SNR	E	20 %
5	Ability to analyze and construct PAM, PWM and PPM signals	E	10 %

Textbook and/ or Refrences

Introduction to communication system, Ferrel Stremler , 1994, third edition Modern Digital and Analog Communication Systems, B.P. Lathi, Oxford University Press,1998, Third Edition Digital and Analog Communication Systems, Leon coach, 2001 ,6th edition Communication system, S.Haykin,John Wily &Sons,2001,Fourth edition. Principles of Communications, Rodger Ziemer, William Tranter, 2008, 6th edition

Assessment Criteria	Percent (%)
First Exam	20 %
Second Exam	20 %
Projects	10 %
Final Exam	50 %

Course Plan

Week	Topic
1	Communication systems overview, block diagram of a communication system, introduction to amplitude modulation (AM)
2	Amplitude modulation types#1: DSB-LC (AM) and DSB-SC generation and demodulation. Electronic circuits used to realize DSB-SC and AM signals
3	Amplitude modulation types#2: Hilbert transform and the Properties of Hilbert transform, SSB-SC, SSB-LC (AM) generation and demodulation.
4	Vestigial sideband modulation: generation and demodulation. Simulation for several types of AM modulation

5	Frequency division multiplexing, Super heterodyne AM receiver, solving design problems using Super heterodyne.
6	Definition of angle modulation, Narrow band FM analysis
7	MIDTERM EXAM 1
8	Wide band FM analysis, Bessel function. FM generation and reconstruction methods
9	Study of the noise in different amplitude modulation schemes
10	Noise in FM signal, comparison of noise in FM and AM systems
11	Introduction to sampling theorem, ideal sampling, natural sampling, flat top sampling
12	Pulse amplitude modulation, pulse position modulation and pulse width modulation, Time division multiplexing
13	MIDTERM EXAM 2
14	Introduction to digital modulation schemes (PCM, Delta-sigma, ASK, FSK and PSK)
15	Introduction to link budget, error detection and correction techniques.
16	Final Exam