ANALOG AND DIGITAL COMMUNICATIONS

IV Semester: ECE

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AECC10	Core	3	0	0	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 45		

Prerequisites: There are no prerequisites to take this course.

I. COURSE OVERVIEW:

Communications emphasize on generation, transmission and reception of audio, video and telephony signals. The course is intended to understand various analog and pulse modulation schemes. Further, it emphasis the knowledge on various digital modulation techniques and linear block codes. Communication system principles are used for real world applications of radio and TV broadcasting systems.

II. COURSE OBJECTIVES:

The students will try to learn:

I. The need of modulation, generation and detection techniques of analog and pulse modulation systems.
II. Familiarize with digital systems like Pulse code modulation (PCM), Differential pulse code modulation (DPCM), Delta modulation (DM) and Adaptive DM.
III. The applications of spread spectrum techniques in secured digital communication systems.

III. COURSE OUTCOMES:

After successful completion of the course, students should be able to:

CO 1	**Outline** the basic concepts of communication system, need ofmodulation and fundamental elements to realize amplitude modulation systems.	Understand
CO 2	**Interpret** the generation and detection techniques of frequency modulated waves used for audio signal transmission systems.	Understand
CO 3	**Illustrate** the concept of pulse modulation schemes, demodulation, sampling, quantization and coding for obtaining ofdigital data.	Understand
CO 4	**Analyze** digital pass band communication schemes (ASK, PSK, FSK) using modulation and demodulation process.	Analyze
CO 5	**Identify** the importance of spread spectrum techniques for secured digital communication systems	Apply
CO 6	**Build** the block codes for error detection and error correction in noisy environment.	Apply

IV. SYLLABUS:

MODULE – I: AMPLITUDE MODULATION (09)

Introduction to communication system, need for modulation, Frequency division multiplexing, Amplitude modulation - time and frequency domain description, single tone modulation, power relations in AM waves, generation of AM waves - switching modulator, detection of AM Waves - envelope detector, DSBSC modulation - time and frequency domain description, generation of DSBSC Waves - Balanced modulators, coherent detection of DSB-SC modulated waves, SSB modulation - time and frequency domain description, frequency discrimination and phase discrimination methods for generating SSB, demodulation of SSB Waves, principle of vestigial side band modulation.

MODULE – II: ANALOG MODULATION (09)

Basic concepts of phase modulation, Frequency modulation: Single tone frequency modulation, Narrow band FM, Wide band FM, constant average power, transmission bandwidth of FM wave -generation of FM signal direct method and Armstrong method, detection of FM Signal: balanced slope detector, phase locked loop, comparison of FM and AM., concept of pre-emphasis and de-emphasis.

MODULE – III: ANGLE AND DIGITAL PULSE MODULATIONS (09)

Pulse modulation: types of Pulse modulation- Pulse amplitude modulation (PAM), Pulse width modulation (PWM), Pulse position modulation (PPM), comparison of FDM and TDM.

Elements of digital communications: Pulse code modulation, pulse code modulation (PCM) generation and reconstruction, quantization noise, uniform and non-uniform quantization and companding, Differential pulse code modulation (DPCM), Delta modulation (DM) and Adaptive DM, Noise in DM.

MODULE – IV: DIGITAL MODULATION TECHNIQUES (09)

Amplitude shift keying (ASK)- modulator, coherent ASK detector, Frequency shift keying(FSK)- modulator, Non-coherent FSK detector, Binary phase shift keying(BPSK)- modulator, detector, principles of QPSK, Differential PSK, Probability of error for ASK,FSK, PSK.

MODULE – V: SPREAD SPECTRUM MODULATION AND ERROR CONTROL CODES (09)

Spread spectrum modulation: Use of spread spectrum; Direct sequence spread spectrum (DSSS); Code division multiple access using DSSS, frequency hopping spread spectrum; PN-Sequences: Generation and characteristics.

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Linear Block Codes: Introduction to error control coding; Matrix description of linear block codes, error detection and error correction capabilities of linear block codes; Hamming code; Binary cyclic codes algebraic structure, encoding and decoding.

V. TEXT BOOKS:

1. Simon Haykin, "Analog and Digital Communications", John Wiley, 2005.
2. Wayne Tomasi, "Electronics Communication Systems-Fundamentals through Advanced", 5th Edition, 2009.
3. K. Sam Shanmugam, "Digital and Analog Communication Systems", John Wiley & Sons, 2nd Edition, 2005.

VI. REFERENCE BOOKS:

1. B.P.Lathi, "Modern Analog and Digital Communication", Oxford reprint, 3rd Edition, 2004.
2. Singh, Sapre, "Communication Systems Analog and Digital", TMH, 2nd Edition, 2004.
3. Herbert Taub, Donald L Schilling, Goutam Saha, "Principles of Communication Systems", 3rd Edition, McGraw-Hill, 2008.

VII. WEB REFERENCES:

1. http://www.uotechnology.edu.iq
2. http://nptel.ac.in/
3. http://www.iare.ac.in

VIII. E-TEXT BOOKS:

1. http://www.bookboon.com/
2. http://www.jntubook.com
3. http://www.smartzworld.com
4. http://www.archive.org