ANALOG AND DIGITAL COMMUNICATION

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:

Analog communications course emphasizes the understanding on generation, transmission and reception of audio, video and telephony signals. The course is intended to provide a thorough representation of signals in time and frequency domain, need of modulation and an effect of noises on the performance of communication systems. Analog 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 communication system and need of modulation.
II. The concepts of Amplitude Modulation and its types (DSB-SC, SSB and VSB).
III. The concepts of Angular Modulation, FM and types of FM.
IV. The behavior of analog communications in the presence of noise and also the basics of analog pulse modulation techniques.

III. COURSE SYLLABUS:

MODULE – I: AMPLITUDE MODULATION (09)

Introduction to communication system, Need for modulation, Frequency Division Multiplexing , Amplitude Modulation, Definition, Time domain and frequency domain description, single tone modulation, power relations in AM waves, Generation of AM waves, square law Modulator, Switching modulator, Detection of AM Waves; Square law detector, Envelope detector, Double side band suppressed carrier modulators, time domain and frequency domain description, Generation of DSBSC Waves, Balanced Modulators, Ring Modulator, Coherent detection of DSB-SC Modulated waves, COSTAS Loop.

MODULE – II: SSB MODULATION (09)

SSB Modulation: Frequency domain description, Frequency discrimination method for generation of AM SSB Modulated Wave, Time domain description, Phase discrimination method for generating AM SSB Modulated waves. Demodulation of SSB Waves, Vestigial side band modulation: Frequency description, Generation of VSB Modulated wave, Time domain description, envelop detection of a VSB Wave pulse Carrier, Comparison of AM Techniques, Applications of different AM Systems.

MODULE – III: ANGLE MODULATION (09)

Basic concepts, Frequency Modulation: Single tone frequency modulation, Spectrum Analysis of Sinusoidal FM Wave, Narrow band FM, Wide band FM, Constant Average Power.

Transmission bandwidth of FM Wave - Generation of FM Waves, Direct FM, Detection of FM Waves: Balanced Frequency discriminator, Zero crossing detector, Phase locked loop, Comparison of FM and AM.

MODULE – IV: NOISE IN ANALOG COMMUNICATION SYSTEM (09)

Types of Noise: Resistive (Thermal) Noise Source, Shot noise, Extraterrestrial Noise, Arbitrary Noise Sources, White Noise, Narrowband Noise- In phase and quadrature phase components and its Properties, Modeling of Noise Sources, Average Noise Bandwidth, Effective Noise Temperature, Average Noise Figures, Average Noise Figure of cascaded networks. Noise in DSB and SSB System Noise in AM System, Noise in Angle Modulation System, Noise Triangle in Angle Modulation System, Pre-emphasis and de-emphasis.

MODULE – V: RECEIVERS (09)

Receiver Types -Tuned radio frequency receiver, Superhetrodyne receiver, RF section and Characteristics - Frequency changing and tracking, Intermediate frequency, AGC, FM Receiver, Comparison with AM Receiver, Amplitude limiting. Pulse Modulation: Types of Pulse modulation, PAM (Single polarity, double polarity) PWM: Generation and demodulation of PWM, PPM, Generation and demodulation of PPM, Time Division Multiplexing.

IV. TEXT BOOKS:

1. S. S. Haykin, "Communication Systems", Wiley Eastern, 2nd Edition, 2006.
2. Taub, Schilling, "Principles of Communication Systems", Tata McGraw-Hill, 4th Edition, 2013

V. REFERENCE BOOKS:

1. B.P. Lathi, "Communication Systems", BS Publication", 2nd Edition, 2006.
2. John G. Proakis, Masond, Salehi, "Fundamentals of Communication Systems", PEA, 1st Edition, 2006
3. George Kennedy, Bernard Davis, "Electronics and Communication System", Tata McGraw Hill, 5th Edition, 2011.

VI. WEB REFERENCES:

1. http://www.web.eecs.utk.edu
2. https://everythingvtu.wordpress.com
3. http://nptel.ac.in/
4. http://www.iare.ac.in