

ANALOG COMMUNICATIONS

IV Semester: ECE								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
AECB12	Core	L	T	P	C	CIA	SEE	Total
		3	1	-	4	30	70	100
Contact Classes: 45	Tutorial Classes: 15	Practical Classes: Nil			Total Classes: 60			

OBJECTIVES:
The course should enable the students to:

- I. Introduce the communication system and need of modulation.
- II. Understand the concepts of Amplitude Modulation and its types (DSB-SC, SSB and VSB).
- III. Understand the concepts of Angular Modulation, FM and types of FM.
- IV. Describe the behavior of analog communications in the presence of noise and also the basics of analog pulse modulation techniques.
- V. Classify and discuss the different types of transmitters and receivers.

COURSE OUTCOMES (COs):

CO 1 Understand the basic concepts of the communication systems and illustrate different amplitude modulation techniques.

CO 2 Analyze the time domain and frequency domain description of SSB and VSBSC and compare various amplitude modulation schemes.

CO 3 Analyze generation and detection of FM signal and comparison between amplitude and angle modulation schemes.

CO 4 Gain the knowledge of different noise sources and evaluate the performance of the communication system in the presence of noise

CO 5 Interpret with different types of receivers and study different pulse modulation and demodulation techniques

COURSE LEARNING OUTCOMES (CLOs):

1. Discuss about the basic elements of communication system, importance of modulation and different types of modulation.
2. Understand the time domain, frequency domain description and power relations of amplitude modulation, various techniques of generation and detection of AM. Noise in AM.
3. Analyze the time domain, frequency domain description of Double Side Band Suppressed Carrier (DSB SC), various generation techniques and detection techniques of DSB SC, Noise in DSB SC.
4. Understand the time domain, frequency domain description of amplitude modulation single side band modulated wave, various techniques of generation and detection of SSB, Noise in SSB SC.
5. Analyze the time domain, frequency domain description of Vestigial side band modulation, generation and detection of VSB
6. Discuss the comparison of different amplitude modulation techniques and applications of various amplitude systems.
7. Analyze the basic concepts of Frequency modulation like single tone , spectrum analysis of frequency modulated wave and transmission bandwidth of FM.
8. Understand the concepts of narrow band frequency modulation, wide band frequency modulation.
9. Discuss the generation of frequency modulation waves by direct method and indirect method and detection methods like balanced frequency discriminator, foster seeley discriminator, phase locked loop etc.,

10. Discuss the different types of Noises and noise source, Narrowband Noise In phase and quadrature phase components and its Properties. 11. Analyze the Noise in DSB and SSB System, Noise in AM System, Noise in Angle Modulation System, Pre-emphasis and de-emphasis circuits. 12. Discuss the concept of receivers in communication system and receiver types like tuned radio frequency receiver and super heterodyne receiver. 13. Analyze the characteristics of the receiver like sensitivity, selectivity, image frequency rejection ratio, choice of intermediate frequency and fidelity. 14. Understand the different Pulse analog modulation techniques. 15. Acquire the knowledge and develop capability to succeed national and international level competitive examinations..		
MODULE-I	AMPLITUDE MODULATION	CLASSES: 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	CLASSES-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	CLASSES-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	CLASSES-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	CLASSES-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.		
Text Books:		
1. S. S. Haykin, “Communication Systems”, Wiley Eastern, 2 nd Edition, 2006.		

2. Taub, Schilling, "Principles of Communication Systems", Tata McGraw-Hill, 4th Edition, 2013.

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.

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>

E-Text Books:

1. <http://www.bookboon.com/>
2. <http://www.jntubook.com>
3. <http://www.smartworld.com>
4. <http://www.archive.org>