Course code	Course Name	L-T-P - Credits	Year of Introduction
EC208	**ANALOG COMMUNICATION ENGINEERING**	3-0-0-3	2016

Prerequisite: EC205 Electronic Circuits

Course Objectives

- To study the concepts and types of modulation schemes.
- To study different types of radio transmitters and receivers.
- To study the effects of noise in analog communication systems.
  To impart basic knowledge on public telephone systems.

Syllabus

Elements of communication system, Need for modulation, Noises, Amplitude Modulation, Amplitude modulator circuits, Demodulator circuits, AM transmitters, Types of AM, Angle modulation: principles of frequency modulation, phase modulation, AM and FM Receivers, Frequency modulator circuits, FM transmitters, FM receiver, Noise in AM and FM systems, Public telephone systems, standard telephone set, cordless telephones.

Expected outcome .

The students will be able to:
  i. understand the different analog modulation schemes.
 ii. understand the fundamental ideas of noises and its effect in communication systems.
iii. explain the principle and working of analog transmitters and receivers.
 iv. know the basic idea of telephone systems.

Text Book:
  1. Dennis Roody and John Coolen, Electronic Communication, Pearson, 4/e, 2011.
  2. George Kennedy, Electronic Communication Systems, McGrawHill, 4/e, 2008.
  3. Tomasi, Electronic Communications System, Pearson, 5/e, 2011.

References:
  1. Blake, Electronic Communication system, Cengage, 2/e, 2012.
  2. Simon Haykin, Communication Systems, Wiley 4/e, 2006.
  3. Taub, Schilling, Saha, Principles of communication system, McGraw Hill, 2013.
  4. Tomasi, Advanced Electronic Communications Systems, Pearson, 6/e, 2012.

	Course Plan		
Module	**Contents**	**Hours**	**Sem. Exam Marks**
I	Introduction, Elements of communication systems, Need for modulation	2	15%
	Noise in communication system, Thermal noise (white noise), Shot noise, Partition noise, Flicker noise, Burst noise, Signal to noise ratio, Noise factor, Noise temperature, Narrow band noise.	3	
II	Amplitude modulation: Sinusoidal AM, Modulation index, Average power, Effective voltage and current, Nonsinusoidal modulation.	4	15%
	Amplitude modulator circuits, Amplitude demodulator circuits, AM transmitters, Noise in AM Systems.	5	
	FIRST INTERNAL EXAMINATION		
III	Single Sideband Modulation: Principles, Balanced modulators, Singly & doubly balanced modulators, SSB generation, Filter method, Phasing method & Third method, SSB reception, Modified SSB systems, Pilot carrier SSB & ISB, Companded SSB.	6	15%

IV	Angle modulation: Frequency modulation, Sinusoidal FM, Frequency spectrum, Modulation index, Average power, Non-sinusoidal modulation, Deviation ratio, Comparison of AM and FM.	4	15%
	AM & FM Receivers: Super heterodyne receiver, Tuning range, Tracking, Sensitivity and gain, Image rejection, Double conversion, Adjacent channel selectivity, Automatic Gain Control (AGC).	4	
SECOND INTERNAL EXAMINATION			
V	Phase modulation, Equivalence between PM and FM, Sinusoidal phase modulation, Digital phase modulation.	3	20%
	Angle modulator Circuits: Varactor diode modulators, Transistor modulators. FM Transmitters: Direct and Indirect Methods.	3	
VI	Angle modulation detectors, Slope detector, Balanced slope detector, Foster-Seeley discriminator, PLL demodulator, Automatic Frequency Control (AFC), Amplitude limiters, Noise in FM systems, Pre-emphasis and De-emphasis.	4	20%
	Telephone systems, standard telephone set, basic call procedures and tones, DTMF, cordless telephones.	4	
END SEMESTER EXAM			

Assignment

Study of

1. The telephone circuit - Local subscriber loop, Private-line circuits, Voice-frequency circuit arrangements.
2. The public telephone network - Instruments, Local loops, Trunk circuits and exchanges, Local central exchanges, Automated central office switches and exchanges.

Question Paper

The question paper shall consist of three parts. Part A covers I and II module, Part B covers III and IV module, Part C covers V and VI module. Each part has three questions, which may have maximum four subdivisions. Among the three questions, one will be a compulsory question covering both modules and the remaining from each module, of which one to be answered. Part A & Part B questions shall carry 15 marks each and Part C questions shall carry 20 marks each with maximum 60 % for theory and 40% for logical/numerical problems, derivation and proof.