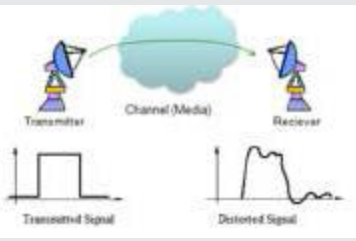
22EC206 COMMUNICATION SYSTEMS



Source- https://thefactfactor.com/facts/pure_science/physics/communication/5058/

Hours Per Week :

L	T	P	C
3	0	2	4

PREREQUISITE KNOWLEDGE: Basics of Integration, differentiation and complex numbers.

COURSE DESCRIPTION AND OBJECTIVES:

This course will focus on the how signals are encoded for transmission and reception. The first part of the course will examine analog communication systems such as AM and FM radio. The second part will concern digital communications, and how digital signals can be encoded and decoded over analog channels.

MODULE-1

UNIT-1 **12L+0T+8P=20 Hours**

AMPLITUDE MODULATION:

Overview of the different modulation schemes and mediums that are used for communications. Amplitude modulation schemes, including commercial AM radio, SSB Modulation and Demodulation.

UNIT-2 **12L+0T+8P=20 Hours**

ANGLE MODULATION SCHEMES:

Narrowband FM, Wideband FM Modulation and Demodulation, Commercial FM, Phase Modulation, Pulse modulation: PAM, PWM, and PPM.

PRACTICES:

- To design the Simulink model of the DSB-AM to analyze each signal in time and frequency domains using time scope and spectrum analyzer
- To examine the effects of the Additive Gaussian Channel (AWGN) in the Simulink Model of DSB-AM
- To observe the real-time music transmission for DSB-AM modulated signal via trans-receiver (Example – USRP)
- To implement the Simulink models for FM including a basic sinusoid and a multimedia file (music) to analyze each signal in time and frequency domains using time scope and spectrum analyzer
- To examine the effects of the Additive Gaussian Channel (AWGN) in the Simulink for FM
- To observe the real-time music transmission for a FM modulated music file Universal Software Radio Peripheral (USRP) USRP trans-receiver

MODULE-2

UNIT-1 **9L+0T+6P=15 Hours**

DIGITAL TRANSMISSION:

Sampling, and the basis for digital communications, Quantization, PCM, line coding, and reducing ISI,

UNIT-2 **15L+0T+10P=25 Hours**

DIGITAL MODULATION SCHEME:

Digital carrier modulation, including ASK, FSK, PSK, QPSK, and QAM SNR and system performance Methods of synchronization,

SKILLS:

- ✓ *Identify the need for modulation and choice of modulation.*
- ✓ *Choose the choice of frequency bands of AM/FM/T.V/ Mobile/Satellite.*
- ✓ *Select the detector/discriminator required in FM.*
- ✓ *Mathematical analysis of the digital modulated signals. !*
- ✓ *Realize 8-PSK, 16-PSK and 32-PSK*

Synchronizing power., Effect of change in excitation and prime mover torque, Two reaction theory - direct and quadrature axis synchronous reactance; Slip test.

PRACTICES:

- Building Simulink Model of BPSK Modulator and Demodulator to measure Bit Error Rate (BER)
- BPSK Modulator and Demodulator Using USRP Hardware
- A Music File Transmission with QPSK
- Building Simulink Model of 16 QAM Modulator and Demodulator.
- A Music File Transmission with 16 QAM
- Simulating Real 16 QAM Transmission

COURSE OUTCOMES:

Upon successful completion of this course, students will have to ability to:

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Make use of different amplitude modulation techniques.	Apply	1	1, 2, 12
2	Analyze performance of different types of modula-tion techniques for a given set of parameters.	Analyze	1,2	1, 2, 5, 12
3	Examine the performance of various digital modulation techniques.	Analyze	2	1, 2, 12
4	Perceive the modulation techniques and analog and Digital communication sub-systems.	Evaluate	1,2	1, 2, 3, 5, 12

TEXT BOOKS:

1. B.P. Lathi and Z. Ding “Modern Digital and Analog Communication Systems”, 5th Edition, Oxford University Press, 2018.
2. S.L. Kalkani and Priyanka “Communication Systems”, 5th Edition, New Age International Publications, 2017.

REFERENCE BOOKS:

1. Simon Haykin and Michael Moher “Communication Systems” 5th Edition, Wiley, 2009.
2. Bruce Carlson and P.B Chilly, Communication System, 5th Edition, Tata McGraw-Hill, 2011
3. Herbert Taub and Donald L Schilling, Principles of Communication Systems, 4th edition, Tata McGraw Hill, 2012,