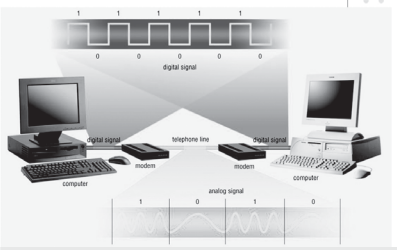

16BM301 ANALOG AND DIGITAL COMMUNICATION

Hours Per Week :

L	T	P	C
3	-	2	4

Total Hours :

L	T	P
45	-	30

WA/RA	SSH/HSH	CS	SA	S	BS
20	48	6	12	3	2

Course Description and Objectives:

This course offers different types of analog and digital modulation techniques used in communicaton systems. The objective of this course is to impart the knowledge to this student in areas like transformations, noise models used in the communication systems.

Course Outcomes:

The student will be able to:

- apply concepts and techniques from Fourier analysis and circuit analysis to communication systems.
- develop the ability to compare and contrast the strengths and weaknesses of various communication systems.
- describe a suitable model for noise in communications.
- determine the signal-to-noise ratio (SNR) performance of analog communications systems.
- describe the basic theory and operation of analog communication systems, especially AM and FM modulation.
- identify, formulate and solve engineering problems.

SKILLS :

- ✓ *Differentiate types of modulation techniques.*
- ✓ *Identify base band signal, carrier and modulated signals.*
- ✓ *Identify the frequency deviation/guard band for FM receiver.*
- ✓ *Identify the Tx/Rx type required for a given application.*
- ✓ *Identify the detector/discriminator.*
- ✓ *Identify inherent or interference noise and classify them.*

ACTIVITIES:

- *Choose the modulation scheme for the given Audio signal with minimum bandwidth.*
- *Choose the modulation scheme for the given voice signal with very good quality.*
- *Design simple AM modulator using discrete components.*
- *Design a VCO (NE 566) to generate FM signal for a given application.*
- *Design the scheme to capturing effect of FM receiver.*

UNIT - 1 **L-9**

ANALOG COMMUNICATION: Noise- Source of Noise - External Noise, Internal Noise, Noise Calculation; Introduction to Communication Systems: Modulation, Types, Need for Modulation. Theory of Amplitude Modulation, Evolution and Description of SSB Techniques, Theory of Frequency and Phase Modulation, Comparison of various Analog Communication System (AM – FM – PM).

UNIT - 2 **L-9**

DIGITAL COMMUNICATION: Amplitude Shift Keying (ASK), Frequency Shift Keying (FSK), Minimum Shift Keying (MSK), Phase Shift Keying (PSK), BPSK, QPSK, 8 PSK, 16 PSK, Quadrature Amplitude Modulation (QAM), 8 QAM, 16 QAM, Bandwidth Efficiency, Comparison of various Digital Communication System (ASK – FSK – PSK – QAM).

UNIT - 3 **L-9**

DATA AND PULSE COMMUNICATION: Data Communication- History of Data Communication, Standards Organizations for Data Communication, Data Communication Circuits, Data Communication Codes, Error Detection and Correction Techniques, Data Communication Hardware, serial and parallel interfaces, Pulse Communication- Pulse Amplitude Modulation (PAM), Pulse Time Modulation (PTM), Pulse code Modulation (PCM), Comparison of various Pulse Communication System (PAM – PTM – PCM).

UNIT - 4 **L-9**

SOURCE AND ERROR CONTROL CODING: Entropy, Source encoding theorem, Shannon fano coding, Huffman coding, mutual information, Channel capacity, Channel coding theorem, Error Control Coding, Linear block codes, Cyclic codes, Convolution codes, Viterbi decoding algorithm.

UNIT - 5 **L-9**

MULTI-USER RADIO COMMUNICATION: Advanced Mobile Phone System (AMPS), Global System for Mobile Communications (GSM), Code division multiple access (CDMA), Cellular Concept and Frequency Reuse, Channel Assignment and Hand off, Overview of Multiple Access Schemes, Satellite Communication, Bluetooth.

LABORATORY EXPERIMENTS

Course Outcomes:

The student will be able to:

- identify and describe different analog modulation techniques.
- analyze AM radio transmitter and receiver.
- use AM techniques in MATLAB simulink.
- understand practical aspects of pulse analog modulations and Pulse digital modulations.
- observe digital modulation techniques.
- know the practical aspects of cyclic and convolutional encoder.

LIST OF EXPERIMENTS: **Total hours-30**

1. Amplitude Modulation and Demodulation*
2. DSB-SC Modulation and Demodulation*
3. SSB-SC Modulation and Demodulation*

4. Frequency modulation and demodulation.
5. Characteristics of mixer.
6. Pre-emphasis and de-emphasis circuits.
7. Sampling theorem verification.
8. Pulse amplitude modulation and demodulation.
9. Time division multiplexing.
10. Delta modulation.
11. Frequency shift keying.
12. Amplitude shift keying.
13. Phase shift keying.
14. Companding: u-Law and A-Law**
15. Huffman coding technique**
16. Convolutional encoder**
17. Cyclic code encoder**

* To be performed both in hardware and software (Simulink).

** To be performed in software Matlab

Any twelve experiment from the above

TEXT BOOK:

1. Wayne Tomasi, "Advanced Electronic Communication Systems", 6th Edition, Pearson Education, 2009.

REFERENCE BOOKS:

1. Simon Haykin, "Communication Systems", 4th Edition, John Wiley & Sons, 2004.
2. Rappaport T.S, "Wireless Communications: Principles and Practice", 2nd Edition, Pearson Education, 2007.
3. H.Taub, D L Schilling and G Saha, "Principles of Communication", 3rd Edition, Pearson Education, 2007.
4. B. P.Lathi, "Modern Analog and Digital Communication Systems", 3rd Edition, Oxford University Press, 2007.
5. Blake, "Electronic Communication Systems", Thomson Delmar Publications, 2002.
6. Martin S.Roden, "Analog and Digital Communication System", 3rd Edition, Prentice Hall of India, 2002.
7. B.Sklar, "Digital Communication Fundamentals and Applications", 2nd Edition Pearson Education, 2007.