

Details of Course

Course Title	Course Structure			Pre-Requisite
Communication System- B. Tech. EP (4 th Sem Lesson Plan)	L	T	P	NIL
	3	0	2	

Course Objectives

This course aims to impart basic knowledge to students regarding communication systems and its applications. To understand the modulation techniques and signal processing methods and their solution to the problem related to real-world transmission challenges. To develop an understanding of various types of modern communication and basic understanding of satellite communication also.

Course Outcomes (COs)

1. Understanding the fundamental principles and concepts of communication systems.
2. Learning various modulation techniques and signal processing methods.
3. Exploring the design and analysis of communication networks and protocols.
4. Gaining practical skills in the implementation and troubleshooting of communication systems.
5. Developing critical thinking and problem-solving abilities to address real-world communication challenges.

New & Revised Syllabus

S. No.	Contents	Content Hours
1.	Introduction to communication systems: Electronic communication system, electromagnetic spectrum-band designations and applications, need for modulation. Concept of Noise, Friis formula. Wireless communication: Evolution of mobile communications, mobile radio systems. Cellular Concept: Frequency reuse, channel assignment, hand off, Interference and system capacity, tracking and grade of service, Improving Coverage and capacity in Cellular systems.	10
2.	Modulation Techniques: Amplitude modulation: modulation index, frequency spectrum, generation of AM (balanced modulator), Amplitude Demodulation (diode detector), Other forms of AM: DSBSC generation (balanced modulator), SSBSC generation (filter method), SSB detection. Pulse Analog Modulation: Sampling theorem, Errors in Sampling. Pulse Amplitude Modulation (PAM), Time Division Multiplexing (TDM). Pulse Width Modulation (PWM) and Pulse Position Modulation (PPM). Generation and detection of PAM, PWM, PPM.	10
3.	Digital Carrier Modulation: Information capacity, Bit Rate, Baud Rate and M-ary coding. Amplitude Shift Keying (ASK), Frequency Shift Keying (FSK), Minimum Shift Keying, Gaussian MSK, M-ary QAM, M-ary FSK, Phase Shift Keying (PSK), Binary Phase Shift Keying (BPSK) and Quadrature Phase Shift Keying (QPSK). QPSK, Amplitude modulation, bandwidth efficiency, carrier recovery – squaring loop, Costas loop, DPSK. Coding: Vocoders, Linear Predictive Coders, Selection of Speech Coders for Mobile Communication, GSM Codec, RS codes for CDPD.	10

4.	Multiple Access Techniques: FDMA, TDMA, CDMA, SDMA, Synchronous & Statistical TDM, North American digital multiplexing hierarchy, European TDM, Spread spectrum: Frequency Hopping & Direct Sequence spread spectrum. Switched Communication Networks: Circuit, Message, Packet & Hybrid Switching, Capacity of Cellular CDMA and SDMA. Second Generation and Third Generation Wireless Networks, WLL, Blue tooth.	07
5.	Satellite communication: Satellite Systems, Orbits and constellations: GEO, MEO and LEO, Satellite space segment, Propagation and satellite links, Free-space loss, Attenuation, polarization, fading and scintillation.	05
	Total	42

Suggested Books:

S. No.	Name of Books/ Authors	Year of Publication/Reprint
1.	T.S. Rappaport, Wireless Communications: Principles and Practice, Second Edition Pearson Education/ Prentice Hall of India	Third Indian Reprint 2003
2.	R. Blake, Wireless Communication Technology Thomson Delmar	2003
3.	W.C.Y. Lee, Mobile Communications Engineering: Theory and Applications, Second Edition McGraw-Hill International	1998
4.	Electronic Communications: Modulation and Transmission, by Robert J. Schoenbeck	1991
5.	Electronic Communications by D. Roddy and J. Coolen	2008
6.	Electronic Communications by Kennedy	2011
7.	Digital and Analog Communication Systems by L.W. Couch	2001
8.	Communication Systems by Haykins	2006
9.	Introduction to Satellite Communications by Bruce R. Elbert	2008

List of experiments for Communication System Lab:

1. To Study and analyze analog modulation and demodulation.
 - 1.1 Amplitude Modulation
 - 1.2 Frequency Modulation
2. To Study and analyze analog pulse modulation and demodulation.
 - 2.1 Pulse amplitude modulation
 - 2.2 Pulse width modulation
 - 2.3 Pulse position modulation
3. To Study and analyze the shift keying technique.
 - 3.1 Amplitude shift keying
 - 3.2 Frequency shift keying
 - 3.3 Phase shift keying
 - 3.4 Differential shift keying
 - 3.5 Quadrature phase shift keying
4. To Study and analyze the different data codes formatting and reformatting.
 - 4.1 Non-return zero coding
 - 4.2 Return to zero coding
 - 4.3 Manchester to zero coding
 - 4.4 Return to bias coding
 - 4.5 Alternate Mark inversion coding
5. To Study and analyze Time-division multiplexing and demultiplexing.

6. To Study Delta modulation and Demodulation using Audio amplifier.
7. To Study Delta modulation and Demodulation using fourth order filter.
8. To Study sampling of analog signal, its pulse code modulation and the reconstruction of analog signal at the receiver end.
9. To Study and analyze the error check code logic for
 - 9.1 Odd parity code
 - 9.2 Even parity code
 - 9.3 Hamming code
10. To Study and analyze the synchronization B/W transmitter and receiver based on
 - 10.1 Sit sheet synchronization
 - 10.2 Frame synchronization