COURSE CONTENT

ANALOG AND DIGITAL COMMUNICATION LAB							
IV Semester: ECE							
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**	
2540474	**Core**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		0	**0**	**2**	**1**	**40**	**60**	**100**
Contact Classes: Nil	**Tutorial Classes: Nil**	**Practical Classes: 32**				**Total Classes: 32**	
Prerequisites: Analog and Digital communication lab							

Course Overview:

This laboratory course provides hands-on experience in implementing and analyzing analog and digital communication systems**.** Students will design, generate, and demodulate various modulation techniques such as AM, FM, DSB-SC, SSB-SC, PCM, DM, FSK, PSK, DPSK, and QPSK. The course also includes experiments on sampling theorem, FDM, and pulse modulation techniques. Emphasis is placed on bridging the gap between theory and practice by verifying modulation indices, spectra, and performance under different signal conditions.

Course Objectives:

The students will try to learn

- Practical generation and demodulation of analog modulation schemes such as AM, FM, DSB-SC, and SSB-SC
- Implementation of multiplexing and sampling techniques**,** and verification of the sampling theorem
- Design of pulse modulation circuits such as PAM, PWM, and PPM using standard ICs
- Generation and demodulation of digital modulation techniques including PCM, DM, FSK, BPSK, DPSK, and QPSK
- Analyze and compare theoretical and practical performance of modulation systems using waveform observation and spectrum analysis

Course Outcomes:

After successful completion of the course, students shall be able to

- Design various Analog modulation and demodulation Techniques and observe the time and frequency domain characteristics of these modulated Signals
- Implement various Pulse modulation and demodulation Techniques and observe the time and frequency domain characteristics of these modulated Signals
- Understand the concept of aliasing and different types of Sampling with various Sampling rates and duty Cycles by implementing practically
- Design and implement various Digital modulation and demodulation Techniques and observe the waveforms of these modulated Signals practically
- Compare theoretical and experimental results through spectrum analysis and waveform observation, drawing conclusions on efficiency and performance

List of Experiments:

1. Generate Amplitude modulated Signal and perform demodulation for different modulation indices. Plot the corresponding waveforms and their spectrum. Compare the modulation index theoretically and practically. Plot the effect of modulating Signal frequency and Amplitude on the modulation index.
2. Generate Frequency modulated Signal and perform demodulation for different modulation indices. Plot the corresponding waveforms and their spectrum. Compare the modulation index theoretically and practically. Plot the effect of modulating Signal frequency and Amplitude on the modulation index.
3. Generate modulated and demodulate DSB-SC Signal for different modulation indices and plot the corresponding waveforms and their spectrum.
4. Generate and demodulate SSB-SC modulated Signal (Phase Shift Method) for different modulation indices and plot the corresponding waveforms and their spectrum.
5. Demonstrate the Frequency Division Multiplexing & De multiplexing practically by transmitting at least 3 different signals simultaneously.
6. Verify Sampling theorem for different sampling rates, Sampling types and Duty Cycles and Plot the sampled and reconstructed Signals. Write the conclusions, based on practical observations.
7. Generate a Pulse Amplitude Modulated & Demodulated signals and plot the corresponding waveforms from the practical observations
8. Generate a Pulse Width Modulated & Demodulated signals and plot the corresponding waveforms from the practical observations
9. Generate PCM Modulated Signal and demodulate it by designing and implementing the corresponding Demodulator. Plot the corresponding waveforms from practical observations
10. Differential pulse code modulation: Generation and detection. Plot the corresponding waveforms from practical observations.
11. Generate Delta Modulated Signal and demodulate it by designing and implementing the corresponding Demodulator. Plot the corresponding waveforms from practical observations.
12. Generate FSK modulated Signal and demodulate it by designing and implementing the corresponding Demodulator. Plot the corresponding waveforms from practical observations.
13. Generate practically Binary PSK modulated Signal and demodulate it by designing and implementing the corresponding Demodulator. Plot the corresponding waveforms from practical observations.
14. Design & Implementation of pre-emphasis & de-emphasis filters. Plot the corresponding waveforms from practical observations.

Open Ended Experiments

1. Spectrum Analyzer
2. Super heterodyne receiver

NOTE: Minimum of 12 experiments to be conducted.

REFERENCE LINK:

1. **https://youtu.be/k9zyKOI-AGs**
2. **https://youtu.be/Mad4kQ5835Y**
3. **https://youtu.be/jXGo4hIZWAY**
4. **https://youtu.be/jZOg39v73c4**
5. **https://youtu.be/6QckLe9Akwg**

MATERIALS ONLINE

1. Lab Manual
2. Open-ended experiments