

5th Semester	REC5C002	Analog and Digital Communication	L-T-P 3-0-0	3Credits
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Module I: (4 hours)

Review of signals and systems, Frequency domain representation of signals, Principles of Amplitude Modulation Systems- DSB, SSB and VSB modulations. Angle Modulation, Representation of FM and PM signals, Spectral characteristics of angle modulated signals.

Module II: (10 hours)

Review of probability and random process. Gaussian and white noise characteristics, Noise in amplitude modulation systems, Noise in Frequency modulation systems. Pre-emphasis and Deemphasis, Threshold effect in angle modulation.

Module III: (12 hours)

Pulse modulation. Sampling process. Pulse Amplitude and Pulse code modulation (PCM), Differential pulse code modulation. Delta modulation, Noise considerations in PCM, Time Division multiplexing, Digital Multiplexers.

Module IV: (6 hours)

Elements of Detection Theory, Optimum detection of signals in noise, Coherent communication with waveforms- Probability of Error evaluations. Base band Pulse Transmission- Inter symbol Interference and Nyquist criterion. Pass band Digital Modulation schemes- Phase Shift Keying, Frequency Shift Keying, Quadrature Amplitude Modulation, Continuous Phase Modulation and Minimum Shift Keying.

Module V: (10 hours)

Digital Modulation trade-offs. Optimum demodulation of digital signals over band-limited channels- Maximum likelihood sequence detection (Viterbi receiver). Equalization Techniques. Synchronization and Carrier Recovery for Digital modulation.

Books:

- [1] Haykin S., "Communications Systems", John Wiley and Sons, 2001.
- [2] Proakis J. G. and Salehi M., "Communication Systems Engineering", Pearson Education, 2002.
- [3] Taub H. and Schilling D.L., "Principles of Communication Systems", Tata McGraw Hill, 2001.
- [4] Wozencraft J. M. and Jacobs I. M., "Principles of Communication Engineering", John Wiley, 1965.
- [5] Barry J. R., Lee E. A. and Messerschmitt D. G., "Digital Communication", Kluwer Academic Publishers, 2004.
- [6] Proakis J.G., "Digital Communications", 4th Edition, McGraw Hill, 2000.

Digital Learning Resources:

Course Name: Analog communication
 Course Link: <https://nptel.ac.in/noc/courses/noc19/SEM2/noc19-ee46>
 Course Instructor: Prof. Goutam Das, IIT Kharagpur

Course Name: Modern Digital Communication Techniques
Course Link: <https://nptel.ac.in/courses/117/105/117105144/>
Course Instructor: Prof. S.S. Das, IIT Kharagpur

Course Name: Communication Engineering
Course Link: <https://nptel.ac.in/courses/117/102/117102059/>
Course Instructor: Prof. Surendra Prasad, IIT Delhi