Semester VI [As Per Choice Based System (CBCS) Scheme]					
Semester	**VI**	**Course Title**	**Advanced communication systems**	**Course Code**	**18EC61**
Teaching Period	**50 Hours**	**L – T – P – TL***	**2 – 1 – 0 – 3**	**Credits**	**4**
CIE*	**40 Marks**	**SEE***	**60 Marks**	**Total**	**100 Marks**
CREDITS – 04					

Course Objectives This course will enable student to:

- Understand and appreciate the need of various modulation and spread spectrum techniques.
- Analyze the properties of basic Modulation techniques and apply them to Digital Communication
- Apply different types of coding techniques to design the optimum receiver for channels with ISI and AWGN.
- Design and develop the different types of modulation techniques, equalizer to improve the performance under fading channels for various applications.

Module -1

Digital Modulation Techniques: Digital modulation formats, Coherent binary modulation techniques, Coherent quadrature – modulation techniques, Non-coherent binary modulation techniques, Comparison of binary and quaternary modulation techniques, M-ray modulation techniques, Power spectra, Bandwidth efficiency, M-array modulation formats viewed in the light of the channel capacity theorem, Effect of inter symbol interference, Bit verses symbol error probabilities, Synchronization, Applications. **L1, L2, L3**

Module -2

Coding Techniques: Convolutional encoding, Convolutional encoder representation, Formulation of the convolutional decoding problem, Properties of convolutional codes: Distance property of convolutional codes, Systematic and nonsystematic convolutional codes, Performance Bounds for Convolutional codes, Coding gain, Other convolutional decoding algorithms, Sequential decoding, Feedback decoding, Turbo codes. **L1, L2, L3**

Module -3

Linear and Adaptive Equalization: Linear equalization, Decision -feedback equalization, Reduced complexity ML detectors, Iterative equalization and decoding - Turbo equalization. Adaptive linear equalizer, adaptive decision feedback equalizer, Recursive least square algorithms for adaptive equalization. **L1, L2, L3**

Module -4
Spread spectrum signals for digital communication: Model of spread spectrum digital communication system, Direct sequence spread spectrum signals, some applications of DS spread spectrum signals, generation of PN sequences, Frequency hopped spread spectrum signals, Time hopping SS, Synchronization of SS systems **L1, L2, L3**
Module -5
Digital Communication through Fading Multipath Channels: Characterization of fading multipath channels, The effect of signal characteristics on the choice of a channel model, Frequency nonselective, Slowly fading channel, Diversity techniques for fading multipath channels, Digital signals over a frequency selective, Slowly fading channel. **L1, L2, L3**
Expected Course Outcomes: After going through this course the student will be able to: • **Explain** merits and demerits of different modulation techniques & coding techniques, spread spectrum signals and channel behaviors • **Analyze** variousmodulation, equalization, diversity and coding techniques for communication systems • **Compare** performance of different types of modulation on different wireless application fading channels. • **Design** and demonstrate various modulation/coding equalization techniques and measure their performance.
Text Book: • Simon Haykin, "Digital Communication", Reprint, Wiley, 2013, ISBN: 0471647357, 9780471647355. • John G. Proakis, "Digital Communications", McGraw Hill, 5th Edition, 2008.
Reference Books: • Bernard Sklar, "Digital Communications - Fundamentals and Applications", Pearson Education (Asia) Pvt. Ltd, 2nd Edition, 2014, ISBN: 1292026065, 9781292026060. • Andrea Goldsmith, "Wireless Communications", Cambridge University Press, 2005.