



# MANIPAL UNIVERSITY JAIPUR

School of Electronics and Electrical Engineering

Department of Electronics and Communication Engineering

Course Hand-out

Communication Systems | EC 1701 | 4 Credits

Session: Jul 2014 - Dec 2014 | Faculty: C. P. Gupta

**Course Outcomes:** At the end of the course, students will be able to

**A. Course Outcomes:** At the end of the course, students will be able to

- [1707.1]. Develop a comprehensive understanding of Communication system techniques, their signal processing with emphasis on mathematical analysis and practical issues.
- [1707.2]. Enhance knowledge in fundamentals of RADARs, Satellite Systems and develop functional understanding in the underlying technologies for modern day requirements of link design, bandwidth and network management features.
- [1707.3]. Develop understanding in mobile cellular communications and radio technologies, frequency reuse, the handoff strategies, interference on cellular system performance and address design issues to mitigate its effects for employability skills.
- [1707.4]. Understand fundamentals of optical fibre systems and apply the knowledge to engineering tasks for evaluation of performance parameters and their optimisation will be useful for research purpose.
- [1707.5]. Evaluate applications of communication systems for various applications in military, space, long haul communications for undertaking entrepreneurship and other start up projects subsequently.

## B. SYLLABUS

**Radar systems:** Introduction to Radar systems, Simple form of Radar range equation. Factors affecting Radar range equation, Pulse Radar, Branch and Balanced type duplexer. Radar displays, Radar beacon, MTI Radar, Delay-line canceler, blind speed; **Telephony:** Basic Telephone system, signaling tones, Digital Subscriber Lines; **Satellite communications:** Introduction to Satellite communication, Basic transmission theory, system noise temperature and G/T ratio, Satellite orbits, Satellite speed and period, angle of elevation, orbital spacing, orbital effects in communication system performance, Satellite subsystems-communication subsystems, Telemetry, command and control subsystems, power subsystem, Satellite link design, frequency allocations, bandwidth, Earth station technology, Multiple access techniques, Application of Satellites – Surveillance, TV, Telephones; **Wireless communication systems:** Introduction to wireless communication systems, Paging systems, cordless telephone systems, Concept of cellular mobile communication-frequency reuse, cell splitting, macro cell and micro cell. Operation of Cellular systems, Mobile radio propagation –Free space propagation model, Ground reflection model, Fresnel zone geometry; **Overview of optical fibers:** Types of Optical fibers. numerical aperture, Concept of cylindrical waveguide, Optical fibers as cylindrical wave guide, V number /parameter; **Attenuation and dispersion in optical fibers:** Losses due to scattering and bending, Optical pulse spreading due to material and waveguide dispersion; **Optical sources and detectors:** Semiconductor LED, Laser diode, hetero- structure construction, DFB and DBR Laser diodes, PIN and APD detectors; **optical communication systems:** Analog and Digital Optical communication systems, SNR and BER. Link power and rise time budget.

## C. References:

1. I. S. Merrill "Introduction to radar systems" Tata McGraw Hill, India (2004).
2. T. Pratt "Satellite communication systems" John Wiley and Sons (2006).
3. W. Stallings "Wireless Communication and networks" Pearson Education (2006).
4. G. Keiser "Optical Fiber Communication" McGraw Hill (1991).

