

## MODERN WIRELESS COMMUNICATIONS

22ECMC1T2

Credits: 4

Lecture: 4 periods/week

Internal assessment: 40 marks  
Semester end examination: 60 marks

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**Pre-Requisites:** Communication Theory

### Course Outcomes

After successful completion of the course, the student will be able to

- To understand wireless communication standards and different types of system models
- To learn diversity techniques
- To identify the different wireless channel models
- To know some information about OFDM systems

### UNIT – I

**Introduction to 3G/4G Wireless Communications:** Introduction, 2G Wireless Standards, 3G Wireless Standards, 4G Wireless Standards, Overview of Cellular Service Progression.

**Principles of Wireless Communications:** The Wireless Communication Environment, Modelling of Wireless Systems, System Model for Narrowband Signals, Rayleigh Fading Wireless Channel, BER Performance of Wireless Systems, Intuition for BER in a Fading Channel, Channel Estimation in Wireless Systems

### UNIT – II

**Diversity in Wireless Communications:** Multiple Receive Antenna System Model, Symbol Detection in Multiple Antenna Systems, BER in Multi-Antenna Wireless Systems, Diversity Order.

### UNIT – III

**Wireless Channel:** Basics of Wireless Channel Modelling, Average Delay Spread in Outdoor Cellular Channels, Coherence Bandwidth in Wireless Communications, Relation Between ISI and Coherence Bandwidth, Doppler Fading in Wireless Systems, Doppler Impact on a Wireless Channel, Coherence Time of the Wireless Channel, Jakes Model for Wireless Channel Correlation, Implications of Coherence Time

### UNIT – IV

**Orthogonal Frequency-Division Multiplexing:** Introduction, Motivation and Multicarrier Basics, OFDM Example, Bit-Error Rate (BER) for OFDM, MIMO-OFDM, Effect of Frequency Offset in OFDM, OFDM – Peak-to-Average Power Ratio (PAPR), SC-FDMA.

### Learning Recourses

#### Text Books

1. Aditya K. Jagannatham, Principles of Modern Wireless Communication Systems Theory and Practice, McGraw Hill Education (India) Private Limited, New Delhi
2. Theodore Rappaport, Wireless Communications, 2<sup>nd</sup> Ed. Pearson

#### Reference Book

1. Simon Haykin , Michael MoherModern, Wireless Communications, Pearson

#### E-Resources

1. [www.wirelesscommunicationstextbooks.com](http://www.wirelesscommunicationstextbooks.com)