## SCHEME OF COURSE WORK

**Course Details:**

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| **Course Title** | **: Wireless Communications** | | |
| **Course Code** | **: 13EC1137** | **L T P C** | **: 4 0 0 3** |
| **Program:** | **: B.Tech.** | | |
| **Specialization:** | **: Electronics and Communication Engineering** | | |
| **Semester** | **: I** | | |
| **Prerequisites** | **Principles of Analog and Digital Communications.** | | |
| **Courses to which it is a prerequisite** | **: --** | | |

**Course Outcomes (COs):**

At the end of the course the student will be able to

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| 1 | Comprehend basic principles and standards of mobile communication systems. |
| 2 | Comprehend the various methods for enhancing the cellular system capacity. |
| 3 | Analyze coding techniques for various wireless applications. |
| 4 | Examine different multiple access techniques. |
| 5 | Comprehend the wireless and cellular radio application. |

**Course Outcome** Versus **Program Outcomes:**

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
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| **CO-1** | M | M | S | M | M | | S | M | | M | M | S |
| **CO-2** | M | S | S | S | S | | M | | | | M | S |
| **CO-3** | M | M | S | S | S | | M | | | M | M | S |
| **CO-4** | S | S | S | S | S | | M | | | | S | S |
| **CO-5** | M | M | S | S | S | | S | | | M | M | S |

*S* - Strongly correlated, *M* - *Moderately* correlated, *Blank* - *No correlation*

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| **Assessment Methods:** | Assignment / Quiz / Seminar / Case Study / Mid-Test / End Exam |

**Teaching-Learning and Evaluation**

| Week | TOPIC / CONTENTS | Course Outcomes | Sample questions | TEACHING-LEARNING STRATEGY | Assessment Method & Schedule |
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| 1 | History of wireless communication, Wireless Generations and Standards, | CO-1 | 1. What are the challenges in wireless communications.<br>2. Discuss the evolution from 1G to 2G, 2.5 G network. | ▫ Lecture/ Discussion | Assignment I/Quiz-I/Mid-I |
| 2 | Mobile Radio signal propagation, path loss and channel models, Large Scale Path Loss | CO-1 | 1. Explain the knife-edge diffraction propagation model used to predict the Received Signal Strength.<br>2. Determine Pathloss when | ▫ Lecture / Discussion<br>▫ Problem solving | Assignment I/Quiz-I/Mid-I |

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| | | | signal experiences degradation due to scattering. | | |
| 3 | Small Scale Path Loss - Rayleigh and Rician Fading | CO-1 | 1. What are the causes and effects of small-scale fading ?<br><br>2. Analyze small scale fading using Two-ray Rayleigh modeling. | ▫ Lecture<br>▫ Problem solving | Assignment I/Quiz-I/Mid-I |
| 4 | Cellular Concept and Cellular System Fundamentals,Frequency Reuse, | CO-1,CO-2 | 1. Determine the distance for the nearest co-channel for a cell having radius 0.8 km and a co-channel reuse factor of 7.<br>2. Explain the concept of Frequency reuse. | ▫ Lecture / Discussion<br>▫ Problem solving | Assignment I/Quiz-I/Mid-I |
| 5 | Channel Assignment Strategies, Handoff Strategies, Interference. | CO-1 | 1. Explain the need for handoff and handoff strategies used in mobile communication.<br>2. Explain CCI and ACI. | ▫ Lecture / Discussion<br>▫ Problem solving | Assignment I/Quiz-I/Mid-I |
| 6 | System Capacity, Trunking and Grade of Service, Improving Coverage & Capacity in Cellular Systems | CO-2 | 1. Define Trunking and Grade of Service.<br>2. Explain different strategies used to increase the Cellular system coverage and capacity . | ▫ Lecture/ Discussion | Assignment I/Quiz-I/Mid-I |
| 7 | Analog Modulation Schemes for Wireless Communication. | CO-3 | 1.Explain modulation scheme used in AMPS mobile systems. | ▫ Lecture/ Discussion | Assignment I/Quiz-I/Mid-I |
| 8 | Diversity, Coding and Interleaving, Source and Channel Coding, | CO-3 | 1. Write the advantages of MSK over QPSK.<br>2. Explain aboutTurbo codes. | ▫ Lecture | Assignment I/Quiz-I/Mid-I |
| **9** | **Mid-Test 1** | | | | |
| 10 | Speech Coding for Wireless Communications, Adaptive Equalization, Multipath Propagation, Doppler frequency shift. | CO-3 | 1. Explain about linear predictive coders used for speech coding.<br>2. What are the differences between linear and non-linear equalizers? Explain decision feedback equalizer. | ▫ Lecture | Assignment II/Quiz-II/Mid-II |
| 11 | Multiplexing and Multiple Access techniques, TDMA,FDMA, | CO-4 | 1. Explain the term interference in the frequency, time, code and space domains.<br>2. Difference between TDMA and FDMA. | ▫ Lecture<br>▫ Discussion | Assignment II/Quiz-II/Mid-II |
| 12 | ALOHA - Packet Radio, Spread Spectrum-CDMA, Frequency Hopped Spread Spectrum, Inter-Symbol Interference (ISI), ISI mitigation; | CO-4 | 1. Explain the modulation process involved in forward CDMA channel.<br>2. Write short notes on packet radio. | ▫ Lecture<br>▫ Discussion | Assignment II/Quiz-II/Mid-II |
| 13 | Equalization, Random Access Protocol | CO-4 | 1. Explain channel access mechanism using RAP. | ▫ Lecture<br>▫ Discussion | Assignment II/Quiz-II/Mid-II |
| 14 | Wireless Networking, Third generation systems and advanced topics, | CO-5 | 1. Write about traffic routing in wireless networks.<br>2.What are the standards used in | ▫ Lecture<br>▫ Discussion | Assignment II/Quiz- |

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| | | | 3G mobile technologies. | | II/Mid-II |
| 15 | Wideband-CDMA | CO-5 | 1. Explain the modulation process involved in Wideband CDMA channel. | ▫ Lecture<br>▫ Discussion | Assignment II/Quiz-II/Mid-II |
| 16 | OFDM Principles, Comparision of OFDM and<br>CDMA | CO-5 | 1. Explain the need of cyclic-prefix in OFDM signal transmission.<br>2. Compare CDMA and OFDM schemes. | ▫ Lecture | Assignment II/Quiz-II/Mid-II |
| 17 | WLAN and Bluetooth. | CO-5 | 1. Explain IEEE 802.11 standanrds.<br>2. Discuss about Bluetooth Technology. | ▫ Lecture | Assignment II/Quiz-II/Mid-II |
| **18** | **Mid-Test 2** | | | | |
| **19/20** | **END EXAM** | | | | |

Course Coordinator

Module Coordinator