

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AEC64b- CELLULAR & MOBILE COMMUNICATIONS

(Professional Elective – II)

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**Course Objectives:** The objectives of the course are to make the students learn about

- To comprehend the basic elements of cellular and mobile communications.
- To introduce about Co-channel interference and cell splitting in cellular communication.
- To gain an understanding of signal coverage and propagation losses.
- To learn about frequency management, channel assignment and the antennas used at cell site and mobile.
- To introduce types of digital cellular networks and hands off mechanism.

**UNIT – I:**

**Cellular Mobile Radio Systems:** Introduction to Cellular Mobile system, performance criteria, uniqueness of mobile radio environment, operation of cellular systems, Hexagonal shaped cells, Analog and Digital Cellular systems.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Understand basic concepts of cellular and mobile communications. L2
- Know about cell shape, Analog and Digital Cellular systems. L1

**UNIT – II:**

**Elements of Cellular Radio System Design:** General description of the problem, concept of frequency channels, Co-channel Interference Reduction Factor, desired C/I from a normal case in a Omni directional Antenna system, Cell splitting, consideration of the components of cellular system.

**Interference:** Introduction to Co-channel interference, real time co-channel interference, Co-channel measurement, design of Antenna system, Antenna parameters and their effects, diversity receiver, non-co-channel interference-different types.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Gain knowledge on Co-channel Interference and cell splitting. L1
- Understand co-channel interference effects and reduction techniques. L2

**UNIT – III:**

**Cell Coverage for Signal and Traffic:** Signal reflections in flat and hilly terrain, effect of human made structures, phase difference between direct and reflected paths, constant standard deviation, straight line path loss slope, general formula for mobile propagation over water and flat open area, near and long distance propagation antenna height gain, form of a point to point model.

At the end of this unit, the student will be able to

- Learn about the cell signal coverage and impact of surrounding environment. L1
- Understand different signal propagation methods and their effects. L2



**UNIT – IV:**

**Cell Site and Mobile Antennas:** Sum and difference patterns and their synthesis, Omni directional antennas, directional antennas for interference reduction, space diversity antennas, umbrella pattern antennas, minimum separation of cell site antennas, high gain antennas.

**Frequency Management and Channel Assignment:** Numbering and grouping, setup access and paging channels channel assignments to cell sites and mobile units, channel sharing and borrowing, sectorization, overlaid cells, non fixed channel assignment.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Know about the consideration of antennas and pattern synthesis at cell site and mobile. L1
- Understand frequency management and channel assignment. L2

**UNIT – V:**

**Handoff:** Handoff, dropped calls and cell splitting, types of handoff, handoff invitation, delaying handoff, forced handoff, mobile assigned handoff. Intersystem handoff, cell splitting, micro cells, vehicle locating methods, dropped call rates and their evaluation.

**Digital Cellular Networks:** GSM architecture, GSM channels, multiplex access scheme, TDMA, CDMA.

**Learning Outcomes:**

At the end of this unit, the student will be able to

- Appreciate the Handoff concept and types of handoff. L1
- Know about different types of digital cellular networks. L1

**Text Books:**

1. W.C. Y. Lee, "Mobile cellular telecommunications", Tata Mc-Graw Hill, 2<sup>nd</sup> Edition, 2006.
2. Theodore. S. Rappoport, "Wireless communications", Pearson Education, 2<sup>nd</sup>Edn., 2002

**Reference Books:**

1. Gordon L. Stuber, "Principles of Mobile communications", Springer International 2<sup>nd</sup> Edition, 2007.
2. Lee , "Wireless and Mobile Communications", Mc Graw Hills, 3<sup>rd</sup> Edition, 2006.
3. Jon W.Mark and Weihua Zhqung, "Wireless communications and Networking", PHI, 2005.
4. R.Blake, "Wireless communication Technology", Thompson Asia Pvt .Ltd., 2004.

**Course Outcomes:**

At the end of this Course the student will be able to

- Learn the basic elements of cellular and mobile communications. L1
- Understand Co-channel interference and cell splitting concepts in cellular communication. L2
- Gain an understanding of signal coverage and propagation losses. L2
- Explain about frequency management, channel assignment and antennas used at cell site and mobile. L1
- Know about types of digital cellular networks and hands off mechanism. L1

