



IV Year-II Semester		T	P	C
		3+1	0	3
CELLULAR AND MOBILE COMMUNICATIONS(RT42041)				

Prerequisite Course:

Antennas and Wave Propagation, Analog Communication and Digital Communications.

Course Description and Objectives:

- Understand the basic cellular concepts like frequency reuse, cell splitting, cell sectoring etc., and various cellular systems.
- Understand the different types of interference s influencing cellular and mobile communications.
- Understand the frequency management, channel assignment and various propagation effects in cellular environment.
- Understand the different types antennas used at cell site and mobile.
- Understand the concepts of handoff and types of handoffs.
- Understand the architectures of GSM and 3G cellular systems.

Course Outcomes:

Upon completion of the course, the student will be able to achieve the following outcomes.

COs	Course Outcomes	POs
1	Identify the limitations of conventional mobile telephone systems; understand the concepts of cellular systems.	3
2	Understand the frequency management, channel assignment strategies and antennas in cellular systems.	3
3	Understand the concepts of handoff and architectures of various cellular systems.	3

SYLLABUS

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.

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.

UNIT II

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-cochannel interference-different types.

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.

UNIT III

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.

UNIT IV

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.

UNIT V

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.

UNIT VI

DIGITAL CELLULAR NETWORKS: GSM architecture, GSM channels, multiplex access scheme, TDMA, CDMA.

TEXTBOOKS :

1. Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2nd Edn., 2006.
2. Principles of Mobile Communications – Gordon L. Stuber, Springer International 2nd Edition, 2007.

REFERENCES :

1. Wireless Communications - Theodore. S. Rappoport, Pearson education, 2nd Edn., 2002.
2. Wireless and Mobile Communications – Lee McGraw Hills, 3rd Edition, 2006.
3. Mobile Cellular Communication – G Sasibhushana Rao Pearson
4. Wireless Communication and Networking – Jon W. Mark and Weihua Zhqung, PHI, 2005.
5. Wireless Communication Technology – R. Blake, Thompson Asia Pvt. Ltd., 2004.