**20EC41E5 - CELLULAR MOBILE COMMUNICATION**

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| **Course Category:** | Program Open Elective | **Credits:** | 3 |
| **Course Type:** | Theory | **Lecture -Tutorial-Practical:** | 2-2-0 |
| **Prerequisite:** | Antenna and Wave Propagation, Radar Engineering  | **Sessional Evaluation:****External Evaluation:****Total Marks:** | 4060100 |

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| **Course****Objectives** | Students undergoing this course are expected to understand: |
| 1. The basic Cellular system
2. The elements of cellular radio system design.
3. The various Prediction models for cell coverage in terms of signal and traffic.
4. The interference problem and its reduction by designing proper antenna system.
5. Frequency spectrum utilization techniques channel & traffic management and evaluation of dropped call rate.
6. The need for digital mobile telephony and studying various mobile systems like GSM & CDMA.
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| **Course Outcomes** | Upon successful completion of the course, the students will be able to: |
| CO1 | Understand cellular communication system with cell splitting, consideration of cellular system, cell-site antennas like elements. |
| CO2 | Design elements for Analog and Digital cellular systems. |
| CO3 | Acquire knowledge about propagation mechanisms, Multipath fading, and channel modeling and co-channel interference. |
| CO4 | Know about different types of channel interferences with cell-site antenna heights and signals coverage cells |
| CO5 | Gain knowledge about Frequency management and Channel assignment and multiple access schemes |
| CO6 | Acquire knowledge about the evolution of GSM, TDMA & CDMA technologies for proper Frequency spectrum utilization. |
| **Course****Content****Course****Content** | **UNIT-I****INTRODUCTION TO CELLULAR MOBILE SYSTEM:** A basic cellular system, performance criteria, uniqueness of mobile radio environment, operation of cellular systems, planning a cellular system, Analog and Digital cellular systems.**UNIT-II****ELEMENTS OF CELLULAR RADIO SYSTEM DESIGN:** General description of the problem, concept of frequency reuse channels, channel interferences reduction factors, desired C/I from a normal case in an Omni-directional antenna system, cell splitting, consideration of cellular system, cell-site antennas & mobile antennas characteristics, antennas at cell-site, mobile antennas.**UNIT-III****CELL COVERAGE FOR SIGNAL & TRAFFIC:** General introduction, obtaining the mobile point-to-point model, propagation over water or flat open area, foiling loss, propagation in near distance, long distance propagation, point-to-point prediction model characteristics, cell-site antenna heights and signals coverage cells, mobile propagation.**UNIT-IV****INTERFERENCE:** Introduction to co-channel interference, real time co-channel interference measurement, design of antenna system, diversity receiver, types of non-co-channel interference, interference between systems.**UNIT-V****FREQUENCY MANAGEMENT & CHANNEL ASSIGNMENT:** Frequency spectrum utilization, setup channels, management & traffic channel assignment, Handoff & their characteristics, dropped call rates and their evaluations. Real-time co-channel interference measurement.**UNIT-VI** **DIGITAL CELLULAR SYSTEM:** Why digital, digital mobile telephony, practical multiple access schemes, Global System for Mobile (GSM), TDMA & CDMA, miscellaneous mobile systems. |
| **Text Books and Reference Books** | **TEXT BOOKS:**1. Mobile Cellular Telecommunication – Analog and Digital Systems by Lee. W. C. Y, Mc Graw Hill, 2nd Edition, 2017.
2. Mobile communication by G.K. behere lopamudra das, SciTech publications, 2010.

**REFERENCE BOOKS:** 1. Principles of communication systems by Taub & shilling, TMH, 4th Edition, 2017
2. Celullar mobile communications by Willium stallings, PHI, 1st Edition, 2001.
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| **E-Resources** | 1. [www.iitg.ernet.in/scifac/qip/public\_html/cd\_cell/EC632.pdf](http://www.iitg.ernet.in/scifac/qip/public_html/cd_cell/EC632.pdf)
2. www.morse.colorado.edu/~tlen5510/text/
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| Contribution of Course Outcomes towards achievement of Program Outcomes  |
|  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
| CO1 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 3 |
| CO2 | 3 | 3 | 2 | 2 | 2 | 2 | 1 | 2 | - | - | - | 2 | 3 | 3 |
| CO3 | 3 | 3 | 3 | 1 | 1 | 1 |  2 | 2 |  - |  - |  - |  2 | 3 | 3 |
| CO4 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | - | - | 2 | 2 | 3 | 3 |
| CO5 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | - | - | 2 | 2 | 3 | 3 |
| CO6 | 3 | 3 | 2 | 2 | 1 | 1 | 1 | 2 | - | - | 1 | 2 | 3 | 3 |