

## CELLULAR AND MOBILE COMMUNICATIONS

<b>Course Code</b>	<b>20EC4702A</b>	<b>Year</b>	IV	<b>Semester</b>	I
<b>Course Category</b>	<b>Professional Elective -IV</b>	<b>Branch</b>	ECE	<b>Course Type</b>	Theory
<b>Credits</b>	3	<b>L-T-P</b>	3-0-0	<b>Prerequisites</b>	Analog Communications Digital Communications
<b>Continuous Internal Evaluation:</b>	30	<b>Semester End Evaluation:</b>	70	<b>Total Marks:</b>	100

### Course Outcomes

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

<b>CO1</b>	Interpret the cellular system design and technical challenges. (L2)
<b>CO2</b>	Analyze the effects for signal propagation (L4)
<b>CO3</b>	Analyze methodologies and mobile system specifications to improve the cellular capacity (L4)
<b>CO4</b>	Analyze digital cellular systems for next generation cellular applications. (L4)

### Mapping of course outcomes with Program outcomes (CO/ PO/PSO Matrix)

Note: 1- Weak correlation    2-Medium correlation    3-Strong correlation

\* - Average value indicates course correlation strength with mapped PO

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2									1			2	
CO2		3								2			3	
CO3		3								2			3	
CO4		3								2			3	
Average* (Rounded to nearest integer)	2	3								2			3	

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### Syllabus

Unit No.	Contents	Mapped CO
I	<b>Cellular and Mobile Radio Systems:</b> Introduction to Cellular Mobile System, Performance criteria, uniqueness of mobile radio environment, operation of cellular systems, Hexagonal shaped cells, Analog and Digital Cellular systems <b>Elements of Cellular Radio System Design:</b> General description of the problem, concept of frequency Reuse channels, Co-channel Interference Reduction Factor, desired C/I from a normal case in a omni directional Antenna system, consideration of the components of Cellular system <b>Interference:</b> 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.	CO1

II	<b>Cell Coverage for Signal and Traffic:</b> 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.	CO1,CO2
III	<b>Cell Site and Mobile Antennas:</b> 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.	CO1,CO3
IV	<b>Handoffs:</b> 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	CO1,CO3
V	<b>Digital Cellular and Mobile Networks:</b> GSM architecture, GSM channels, GSM Radio Subsystems, GSM Channels, 4G evolution, Advantages of 4G over 3G, Applications of 4G, Limitations of 4G. 5G evolution.	CO4

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<b>Learning Resources</b>	
<b>Text Books</b>	
1. W.C.Y. Lee, Mobile Cellular Telecommunications, McGraw Hill, 2 <sup>nd</sup> Ed, 1989.	
2. T.S Rappaport, Wireless Communications, Pearson Ed., 2 <sup>nd</sup> Ed., 2002.	
<b>Reference Books</b>	
1. Gottapu Sasi bhushana Rao, Mobile Cellular Communication, Pearson Education, New Delhi, 2013.	
2. R. Blake, Wireless Communication Technology –Thompson Asia Pvt. Ltd., 2004.	
3. Jon W. Mark and Zhqung, Wireless Communication and Networking, PHI, 2005.	
4. Lee, Mobile Communications –Mc Graw Hill	
<b>e- Resources &amp; other digital material</b>	
1. <a href="https://nptel.ac.in/courses/106/106/1061061067/">https://nptel.ac.in/courses/106/106/1061061067/</a>	
2. <a href="https://nptel.ac.in/courses/117104099/">https://nptel.ac.in/courses/117104099/</a>	
3. <a href="https://swayam.gov.in/nd1_noc19_ee48/preview">https://swayam.gov.in/nd1_noc19_ee48/preview</a>	