III Year II Semester	L	T	P	C
Code: 20EC6638	3	1	0	4

CELLULAR AND MOBILE COMMUNICATIONS

Course Objectives:

1. Understand the basic concept of cellular mobile systems.
2. Introduce various types of interference in cellular mobile system.
3. Introduce various antenna for cell sites and its coverage.
4. Understand multiple access techniques in mobile communication.
5. Introduce all cellular standards from 2G to 5G.

Unit I

CELLULAR MOBILE RADIO SYSTEMS: Introduction to Cellular Mobile System, uniqueness of mobile radio environment, operation of cellular systems, consideration of the components of Cellular system, Hexagonal shaped cells, Analog and Digital Cellular systems.

CELLULAR CONCEPTS: Evolution of Cellular systems, Concept of frequency reuse, frequency reuse ratio, Number of channels in a cellular system, Cellular traffic: trunking and blocking, Grade of Service; Cellular structures: macro, micro, pico and femto cells; Cell splitting, Cell sectoring.

Unit II

INTERFERENCE: Types of interferences, Introduction to Co-Channel Interference, real time Co-Channel interference, Co-Channel measurement, Co-channel Interference Reduction Factor, desired C/I from a normal case in a omni directional Antenna system, design of Antenna system, antenna parameters and their effects, diversity receiver, non-co channel interference-different types.

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, 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.

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

DIGITAL CELLULAR NETWORKS: GSM architecture, GSM channels, multiple access schemes; TDMA, CDMA, SDMA.

Unit V

Introduction to modern cellular standards – 2G Architecture– 2.5G – GPRS: GPRS and its features – GPRS network architecture – GPRS protocol architecture – GPRS backbone network – 3G standard details such as UMTS – Introduction to 4G, LTE and 5G .

Course Outcomes:

A student who successfully fulfils this course requirement will be able to:

S. No	Course Outcome	BTL
1	Explain the basic concepts of cellular mobile system.	L2
2	Demonstrate co-channel and non co-channel interferences.	L2
3	Categorize various antenna for cell sites and its coverage.	L4
4	Classify multiple access techniques in mobile communication.	L2
5	Define all cellular standards from 2G to 5G.	L1

Correlation of COs with POs & PSOs:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1	-	-	-	-	-	-	-	-	-	-	2	-
CO2	2	2	2	-	-	-	-	-	-	-	-	-	2	-
CO3	2	2	2	-	-	2	1	-	-	-	-	-	2	-
CO4	2	2	2	-	-	-	-	-	-	-	-	-	2	-
CO5	2	2	2	-	-	1	1	-	-	-	-	2	2	-

Text Books:

1. Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2rd Edn., 2006.
2. Wireless Communications – Theodore. S. Rapport, Pearson education, 2nd Edn., 2002.
3. Mobile Cellular Communication – G Sasibhushana Rao , Pearson Education, 2012.
4. 4G, LTE-Advanced Pro and The Road to 5G - Erik Dahlman, Stefan Parkvall, &Johan Sko¨Id, 3rd edition, Elsevier, 2016.

Reference Books:

1. Wireless and Mobile Communications – Lee McGraw Hills, 3rd Edition, 2006.
2. Mobile Cellular Communication – G Sasibhushana Rao Pearson.
3. Wireless Communication and Networking – Jon W. Mark and Weihua Zhqung, PHI, 2005.
4. Wireless Communication Technology – R. Blake, Thompson Asia Pvt. Ltd., 2004.
5. Principles of Mobile Communications – Gordon L. Stuber, Springer International 2nd Edition, 2007.