

# **RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL**

## **New Scheme Based On AICTE Flexible Curricula**

### **Electronics & Communication Engineering, VII-Semester**

#### **Open Elective EC- 703 (A) Cellular Mobile Communication**

##### **Course Outcomes**

- 1. Understand various communication standards and multiple accesses**
- 2. Cellular concepts and basics and design**
- 3. Frequency allocation, Reuse, and antennae for mobile communication**
- 4. Various interferences and reduction techniques**
- 5. Various cellular generation, standards and trends**

##### **Unit-I**

###### **Introduction to cellular mobile system**

A basic cellular system, performance criteria, uniqueness of mobile radio environment, operation of cellular systems, planning of cellular system

###### **Elements of cellular radio system design**

General description of problem, concept of frequency reuse channels, co-channel interference reduction factor, desired C/I in an omni-directional antenna system, hand off mechanism, cell splitting, components of cellular systems.

##### **Unit-II**

###### **Cell coverage for signal and traffic**

General introduction, mobile point-to-point model, propagation over water or flat open area, foliage loss, propagation in near- in distance, long distance propagation, path loss from point-to-point prediction model, cell site antenna heights and signal coverage cells, mobile-to-mobile propagation.

###### **Cell site antennas and mobile antennas**

Equivalent circuits of antennas, gain and pattern relationship, sum and difference patterns, antennas at cell site, unique situations of cell site antennas, mobile antennas.

##### **Unit-III**

###### **Cochannel interference reduction**

Cochannel interference, real time cochannel interference measurement at mobile radio transceivers, design of antenna systems - omni directional and directional, lowering the antenna height, reduction of cochannel interference, umbrella- pattern effect, diversity receiver, designing a system to serve a predefined area that experiences cochannel interference.

###### **Types of Noncochannel interference**

Adjacent channel interference, near-end-far-end interference, effect on near-end mobile units, cross-talk, effects of coverage and interference by applying power decrease, antenna height decrease, beam tilting, effects of cell site components, interference between systems, UHF TV interference, long distance interference.

## **Unit-IV**

### **Frequency management and Channel Assignment**

Frequency management, frequency spectrum utilization, setup channels, channel assignment, fixed channel assignment, non-fixed channel assignment algorithms, additional spectrum, traffic and channel assignment, perception of call blocking from the subscribers

### **Handoffs and dropped calls**

Value of implementing handoffs, initiation of handoff, delaying a handoff, forced handoff, queuing of handoff, power- difference handoff, mobile assisted handoff and soft handoff, cell-site handoff and intersystem handoff, dropped call rate formula.

## **Unit-V**

### **Digital Cellular Systems**

GSM- architecture, layer modeling, transmission, GSM channels and channel modes, multiple access scheme. CDMA- terms of CDMA systems, output power limits and control, modulation characteristics, call processing, hand off procedures. Miscellaneous mobile systems- TDD systems, cordless phone, PDC, PCN, PCS, non cellular systems.

### **References:**

1. Lee: Cellular and Mobile Telecommunication- Analog & digital systems, TMH.
2. Rappaport: Wireless Communications- principles and practice, Pears
3. Lee: Mobile communications design fundamentals, Wiley India.
4. Faher Kamilo: Wireless Digital Communication, PHI Learning.
5. Raj Kamal: Mobile Computing, Oxford University Press.