**Module 1**

**Fundamentals of Mobile Communication**

**Multiple Access Schemes**

1. Explain multiple access techniques.

(Or)

Compare and contrast FDMA, TDMA, SDMA, OFDM, CDMA and SSMA.

1. Discuss non-linear effects in FDMA.

**Frequency reuse, channel assignment strategies, handoff strategies, interference and system capacity, trunking and grade of service, improving the capacity of cellular systems. and related design problems**

1. Derive the relationship between S/I (Signal to interference) and cluster size N.
2. Explain channel assignment strategies.
3. Explain cellular capacity and coverage improvement techniques.
4. Discuss frequency reuse in cellular systems.
5. How does sectoring improve S/I in cellular systems?
6. Derive relationship between channel capacity C and cluster size N.

**Introduction to wire1ess communication**

1. Compare cordless telephony, paging system and cellular system.

**Numerical**

**(1).** Consider geographical area of a cellular system is 480 sq. km. 910 radio channels are available for traffic handling. Suppose area of a cell is 8 sq. km.

i) How many times would the cluster size of 7 have to be replicated in order to cover the entire service area? Calculate the number of channels per cell and system capacity.

ii) If the cluster size is decreased from 7 to 4, then does it increase the system capacity?

(2). If 36 MHz total spectrum is allocated for a duplex wireless cellular system and simplex channel has 25 MHz RF bandwidth, find the total number of duplex channels, number of channels per cell if N=4 cell reuse is used.

(3). If S/I of 15 dB is required for satisfactory forward channel performance of a cellular system, what is the frequency reuse factor and cluster size that should be used for maximum capacity if path loss exponent is a) n=3 and b) n=4? Assume six first tier co channel cells and mobile unit is at the centre of the cell.

**Module 2**

**2G Technologies**

**GSM**

1. Give a complete functional account on NSS
2. What is meaning of traffic channel, signaling channel, broadcast channels & common Control channel, logical channels with respect to GSM

3. Draw the block diagram and explain GSM architecture in details indicating all the interfaces.

(Or)

Explain GSM System Architecture

(Or)

Explain GSM System Network Architecture

4. Explain in details signaling protocol architecture used in GSM.

5. Explain frame structure used in GSM

6. Explain GSM Speech processing in detail

7. Explain Authentication in GSM

(Or)

Write short notes on security algorithms in GSM

(Or)

Write short notes on Authentication in GSM

8. How system coverage and capacity can be improved in GSM

9. Explain GSM Service and features and specifications of radio transmission in GSM System

10. Write short notes on SMS on GSM

11. Write the Short notes on Hand off, cell dragging in GSM

**Numerical**

12. The Channel data rate is 270.33 kbps in GSM Standard that is 40% of maximum data rate that can be supported in a 200 KHz channel Bandwidth. Calculate the corresponding theoretical S/N required.

**CDMA**

1. How is power control applied in forward CDMA channel?

2. Explain mobile assisted soft handoff procedures in a CDMA based secular system

3. Explain features of CDMA

4. With the neat diagram explain forward and reverse CDMA Channel

5. Describe open loop and closed loop system of power control in CDMA

6. Explain variable data rate transmission in CDMA

**IS 95**

1. Sketch the block diagram of reverse IS 95 Channel modulation for a single user. Explain each block
2. How is power control applied in forward traffic channel of IS95

(Or)

Explain IS 95 reverse traffic channel

1. Explain the frequency and channel specification IS-95

**GPRS**

1. Write short notes on GPRS Technology

(Or)

Discuss GPRS Technology

(Or)

Draw and explain GPRS Architecture

**Module 3**

**3G Technology**

**WCDMA and CDMA 2000**

Q.1 Give the technical differences in W-CDMA and CDMA – 2000.

Q.2 Explain forward link feature of CDMA – 2000 and also explain the basic services provided by upper layer of CDMA – 2000.

Q.3 Elaborate on forward channel W-CDMA.

Q.4 Compare IS-95, WCDMA and CDMA 2000 with respect to channel bandwidth, chip rate, modulation scheme, data rate and frame size.

Q.5 Explain RAKE receiver in CDMA

**3G**

Q.6 Explain Handoff and Power control in 3G system.

Q.7 Give the 3G CDMA evolution path.

**IMT**

Q.8 Discuss IMT – 2000 system