

(3 Hours)

[Total marks: 80]

Note:

- 1) Question no. 1 is compulsory.
- 2) Write any three questions from remaining five questions.
- 3) Assume suitable data if necessary.

Q.1 (20)

- a. What is near far problem in CDMA how to overcome it?
- b. Explain call procedure in GSM for network to mobile terminated call.
- c. What is node B, explain its responsibilities.
- d. What are the factors influencing Small scale fading?
- e. If a total of 33 MHz of bandwidth is allocated to a particular FDD cellular telephone system which uses two 25 kHz simplex channels to provide full duplex voice and control channels, compute the number of channels available per cell if a system uses (a) four-cell reuse, (b) seven-cell reuse, and (c) 12-cell reuse.

Q.2 (20)

- a. Sketch UMTS Network Architecture and explain it in detail.
- b. Compare IS95, WCDMA and CDMA2000.

Q.3 (20)

- a. Describe algorithms used for authentication & security in GSM with diagrams.
- b. Draw reference architecture in GPRS and explain role of GGSN and SGSN.

Q.4 (20)

- a. Explain the use of two ray Model to explain Mobile Radio Path Loss and Antenna Height Effects?
- b. Consider a cellular system in which total available voice channels to handle the traffic are 960. The area of each cell is  $6\text{Km}^2$  and the total coverage area of the system is  $2000\text{KM}^2$ . Calculate
  - 1) The system capacity if the cluster size,  $N=4$
  - 2) The system capacity if the cluster size,  $N=7$How many times would a cluster of size 4 have to be replicated to cover the entire cellular area? Does decreasing the reuse factor  $N$  increase the system capacity? Justify your answer.

Q.5 (20)

- a. How RAKE receiver improves S/N ratio in CDMA also explain why power control on the reverse channel is essential?

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**b.** A Base station has a 900 MHz transmitter and a vehicle is moving at the speed of 50 kmph. Compute the received carrier frequency if the vehicle is moving: (i) Directly towards the BS, (ii) Directly away from the BS, (iii) In a direction that is  $60^\circ$  to the direction of arrival of the transmitted signal?

**Q.6**

**(20)**

- a.** Describe the concept of software defined radio, Explain it in detail.
- b.** Sketch and Explain LTE network architecture and various interfaces.

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