

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER-VIII EXAMINATION – SUMMER 2016****Subject Code:183204****Date:16/05/2016****Subject Name:Wireless and mobile Communication (Department Elective II)****Time:10:30 AM to 01:00 PM****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) Prove that for a hexagonal geometry, the co-channel reuse ratio is given by  $Q = \sqrt{3N}$ , where  $N = i^2 + ij + j^2$  **07**
- (b) Discuss the following terms in brief: **07**
- 1) Frequency Reuse
  - 2) Co-channel Interference
- Q.2** (a) Differentiate between Large scale and Small scale propagation models. Also derive equation and explain free space propagation model. **07**
- (b) A Cellular service provider decides to use a digital TDMA scheme which can tolerate a Signal to Interference (S/I) Ratio of 15dB in the worst case. Assume path loss exponent is equal to 4. Find the optimal value of Cluster size (N) for followings: **07**
- i) Omni-directional antenna
  - ii) 120 degree sectoring
  - iii) 60 degree sectoring
- Should sectoring be used? If yes, then which out of two?
- OR**
- (b) If 20MHz of total spectrum is allocated for a duplex wireless cellular system and each simplex channel has 25KHz RF Bandwidth. Compute the following: **07**
- i) total no. of duplex channels
  - ii) total no. of channels per cell site if N=4 cell reuse is used
  - iii) total no. of channels per cell site if N=7 cell reuse is used
- Q.3** (a) Discuss following terms in brief: **07**
- i) Coherence Bandwidth
  - ii) Multi path delay spread
  - iii) Doppler spectrum
- (b) Sketch reference architecture of GSM and explain the role of VLR, HLR and AuC in detail. **07**
- OR**
- Q.3** (a) Discuss in brief three basic propagation mechanisms which may impact the propagation of signal in cellular communication. **07**
- (b) Draw the block diagram of Speech processing in GSM. Explain the process of Authentication and Encryption in GSM in detail. **07**
- Q.4** (a) Discuss the process of Handing over a call in GSM environment when a subscriber moves from his base (home) network to the roaming network. Enlist all steps associated with this Hand off process and sketch suitable block diagram for reference. **07**
- (b) What is the main difference between Multiplexing and Multiple Access techniques? List various Multiple Access techniques applicable to mobile **07**

communication and explain TDMA frame structure in brief.

**OR**

- Q.4 (a)** Discuss various parameters relevant to air interface of GSM. Draw the GSM TDMA frame, multi frame and super frame structure and justify the significance of each of the parameters in the above frames. **07**
- (b)** Compare and contrast following multiple access techniques: **07**
- i) FDMA
  - ii) OFDMA

- Q.5 (a)** Explain forward channel operation in IS-95 CDMA technique. Also clarify in brief that how is it different from reverse channel operation. **07**
- (b)** In connection with recent trends in cellular communication, what are the roles of SDR and Wireless Adhoc Networks? **07**

**OR**

- Q.5 (a)** Discuss in detail about operation of RAKE receiver in CDMA systems. Also clarify that on what basis performance of CDMA system can be computed. **07**
- (b)** Explain following terms in brief with reference to IS-95 CDMA: **07**
- i) Power control mechanism
  - ii) Frequency Hopping
  - iii) Soft Hand off

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