Seat No.: _____ Enrolment No._____

# GUJARAT TECHNOLOGICAL UNIVERSITY

**BE - SEMESTER–VII (NEW) EXAMINATION – WINTER 2018**

**Subject Code: 2171004** **Date: 26/11/2018**

**Subject Name: Wireless Communication**

**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.**

| | | | MARKS |
|---|---|---|---|
| **Q.1** | **(a)** | Why hexagonal cell shape is preferred in cellular architecture? | **03** |
| | **(b)** | Illustrating the upgrade paths 2G and 3G cellular network and describe in brief. | **04** |
| | **(c)** | Draw and Explain GSM system architecture. | **07** |
| **Q.2** | **(a)** | Explain the following terms :<br>(i) Cell dragging (ii) RSSI (iii) Dwell time | **03** |
| | **(b)** | Explain the concept of frequency reuse in cellular system. | **04** |
| | **(c)** | For a regular hexagonal geometry show that co-channel reuse ratio is $Q = \sqrt{3N}$ , where $N= i^2+ij+j^2$. | **07** |
| | | **OR** | |
| | **(c)** | If a signal to interference ratio 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 the path loss exponent is (1) n=4 (2) n=3 ?<br>Assume that there are six co channel cells in the first tier and all of them are at the same distance from the mobile. Use suitable approximations. | **07** |
| **Q.3** | **(a)** | Briefly describe Hand-off strategies in cellular system. | **03** |
| | **(b)** | Briefly explain different channel assignment strategies. | **04** |
| | **(c)** | Consider a transmitter which radiates a sinusoidal carrier frequency of 1850 Mhz. For a vehicle moving 60 mph, compute the received carrier frequency if the mobile is moving:<br>i. Directly toward the transmitter.<br>ii. Directly away from the transmitter.<br>iii. In a direction which is perpendicular to the direction of arrival of transmitted signal. | **07** |
| | | **OR** | |
| **Q.3** | **(a)** | Explain the concept of umbrella cell. | **03** |
| | **(b)** | Mention the techniques to improve the capacity in cellular system and explain any one. | **04** |
| | **(c)** | A unit gain antenna with a maximum dimension of 1 m produces 50 W power at 900 MHz. Find (i) the transmit power in dBm and dB, (ii) the received power at a free space distance of 5 m and 100 m. | **07** |
| **Q.4** | **(a)** | What is Brewster angle? | **03** |
| | **(b)** | Explain: I-persistent CSMA, non-persistent CSMA, p-persistent CSMA. | **04** |
| | **(c)** | Explain free space propagation model with necessary equations. | **07** |
| | | **OR** | |

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| **Q.4** | **(a)** | What is Huygen's principle? | **03** |
| | **(b)** | Compare TDMA, FDMA and CDMA techniques. | **04** |
| | **(c)** | Describe the various outdoor propagation models. | **07** |
| **Q.5** | **(a)** | Explain three types of soft handoffs in IS-95 standard. | **03** |
| | **(b)** | Compare Wi-Fi and WiMAX. | **04** |
| | **(c)** | Explain the working of UWB radio. Discuss the features, advantages and disadvantages of UWB technology. | **07** |

**OR**

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|---|---|---|---|
| **Q.5** | **(a)** | Give the classification of GSM channels. | **03** |
| | **(b)** | Determine frame efficiency of a TDMA frame structure used in GSM system. | **04** |
| | **(c)** | Write a short note on OFDM. | **07** |

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