Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME - SEMESTER–I(New course)• EXAMINATION – WINTER- 2015

Subject Code: 2712702 **Date: 31/12/2015**

Subject Name: 3G & 4G Mobile Communication

Time:2:30 pm to 5:00 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)** Derive the mathematical model for wireless channel. From the statistics of the Fading coefficient $h = Ae^{-j\varphi}$, derive the Rayleigh fading density function and independentness of A and φ . **07**

(b) Mathematically and intuitively prove that BER is decreasing with the increase in the number of receiver antenna. Assumption: All deep fade events are INDEPENDENT. **07**

Q.2 **(a)** In a wireless system signal propagated through four different path. The delay and path gain are shown in table-1. Find MAX delay spread and RMS delay spread. **07**

Path No.	1	2	3	4
Path Delay	0μs	1 μs	3 μs	5 μs
Path gain	-20dB	-10 dB	0 dB	-10 dB

Table-1

(b) Define Diversity order. Find the diversity order of (i) L receiver antenna system (ii) wireline system. Physically, diversity order indicates what? **07**

OR

(b) Derive the BER expression for wireless systems. **07**

Q.3 **(a)** (i) Define coherence time and coherence bandwidth. **07**
(ii)Give expression of coherence time and coherence bandwidth.
(iii)Give condition for following channel in terms of coherence time and delay spread. (1) Fast fading channel (2) No ISI (3) Frequency selective channel.

(b) Explain principle of operation of RAKE receiver **07**

OR

Q.3 **(a)** Why PN sequences are required in CDMA? How to generate it? **07**

(b) Explain advantages of CDMA in detail. **07**

Q.4 **(a)** What is OFDM? Explain OFDM system in detail. Also highlight requirement of cyclic prefix. **07**

(b) Write short note on MIMO spatial multiplexing – BLAST. **07**

OR

Q.4 **(a)** Discuss implementation issues with OFDM such as PAPR and frequency & Timing offset. **07**

(b) Explain MIMO diversity in detail. **07**

Q.5 **(a)** Explain WCDMA wireless standards in detail. **07**

(b) What is UWB? Explain UWB standard and its features in detail. **07**

OR

Q.5 **(a)** Write short note on LTE. **07**

(b) Explain data modulation and Bit error rate performance for UWB system. **07**

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