

Register No.: ..... Name: .....

**SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)**

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

**SECOND SEMESTER M.TECH DEGREE EXAMINATION (Regular), JULY 2022****TELECOMMUNICATION ENGINEERING****(2021 Scheme)****Course Code: 21TE203****Course Name: Wireless Communication Networks****Max. Marks: 60****Duration: 3 Hours****PART A***(Answer all questions. Each question carries 3 marks)*

1. Summarize the diffraction mechanism of wave propagation in mobile communication.
2. Define coherence time and coherence bandwidth.
3. Explain the near-far problem associated with CDMA communication systems.
4. Draw the block diagram of a multicarrier transmitter and receiver.
5. Illustrate the requirements for LTE.
6. Explain the cellular concept for LTE.
7. What are smart antennas? Explain its significance?
8. Draw and explain the V-BLAST architecture for MIMO channels.

**PART B***(Answer one full question from each module, each question carries 6 marks)***MODULE I**

9. Illustrate two ray ground reflection model. (6)

**OR**

10. Calculate the received power at a distance of 3km from the transmitter if the path loss exponent is 4. Assume the transmitting power of 4W at 800 MHz, a shadow effect of 10.5dBm and the power at reference distance ( $d_0=100m$ ) of -32 dB. What is the allowable path loss? (6)

**MODULE II**

11. Describe the need for diversity? List and explain different diversity techniques. (6)

**OR**

12. Derive the probability of error under a fading channel. (6)

**MODULE III**

13. Analyze the performance of CDMA downlink with multiple users. (6)

OR

14. A spread spectrum communication system has the following parameters. PN sequence chip duration  $1\mu\text{s}$ , information bit duration  $4.095\text{ms}$ . Find jamming margin, processing gain and length of the chip sequence. Given  $E_b/N_0=10$ . (6)

## MODULE IV

15. Describe Single-Carrier Frequency Division for multiple access with transmitter and receiver. (6)

OR

16. Explain OFDM transmitter and receiver with cyclic prefix. (6)

## MODULE V

17. Illustrate downlink physical data and control channels in LTE. (6)

OR

18. Discuss the process of synchronization and cell search in LTE. (6)

## MODULE VI

19. Interpret the parallel decomposition of the MIMO channel. (6)

OR

20. Find the equivalent parallel channel model for a MIMO channel with channel gain (6)

$$\text{matrix H} = \begin{bmatrix} 0.1 & 0.3 & 0.7 \\ 0.5 & 0.4 & 0.1 \\ 0.2 & 0.6 & 0.8 \end{bmatrix}$$

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