

Register No.: Name:

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

THIRD SEMESTER M.TECH DEGREE EXAMINATION (Regular), FEBRUARY 2022**TELECOMMUNICATION****(2020 Scheme)****Course Code : 20ECTET231****Course Name: SPACE TIME CODING AND MIMO SYSTEMS****Max. Marks : 60****Duration: 3 Hours****PART A***(Answer all questions. Each question carries 3 marks)*

1. Compare MIMO with SISO antenna system.
2. What is meant by diversity gain? How is it expressed?
3. Define rank and determinant criteria for designing space time code.
4. Generator matrix of a space-time code has similarities and differences with the conventional concept of the generator matrix for linear codes. Justify with example
5. Differentiate between spatial multiplexing and space time coding.
6. Explain the basic idea behind sphere decoding.
7. Comment on the performance of spatial multiplexing and space time coding in terms of throughput and diversity.
8. What is the basic idea behind OFDM? Explain using a block diagram.

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

9. Consider a MIMO system with 'M' transmitters and 'N' receivers. Apply the transmission model and express the received signal in matrix form. (6)

OR

10. How the capacity of a deterministic MIMO channel is defined? Express the capacity under the assumption that CSI is known at the receiver as well as at the transmitter. (6)

MODULE II

11. What are the three basic types of diversity schemes? Explain each in detail with the help of illustrations. (6)

OR

12. With the help of block diagrams, compare the maximal ratio combining technique with selection combining in the case of space diversity scheme. Comment on the performance of both. (6)

MODULE III

13. Explain Alamouti coding scheme with the help of transmitter and receiver block diagram. (6)

OR

14. Explain maximum mutual information criterion. (6)

MODULE IV

15. A real orthogonal design exists if and only if $N = 2, 4, 8$. Prove this theorem considering $N=4$. (6)

OR

16. Describe encoder and decoder for QOSTBC taking an example. (6)

MODULE V

17. Describe V-Blast architecture with block diagrams of encoder and decoder (6)

OR

18. Explain D-Blast and Turbo-Blast encoders with respective block diagrams. How are they different from V-Blast? (6)

MODULE VI

19. With the help of a block diagram, discuss the general frame work for combining spatial multiplexing and space-time coding (6)

OR

20. Discuss the implementation issues with MIMO-OFDM (6)
