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

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

FOURTH SEMESTER B.TECH DEGREE EXAMINATION (R), MAY 2024

(2020 SCHEME)

Course Code : 20ECT292

Course Name: Nano Electronics

Max. Marks : 100 **Duration: 3 Hours**

PART A

(Answer all questions. Each question carries 3 marks)

1. Enumerate the limitations of conventional microelectronics.
2. Explain the density of state of a 1D nanostructure.
3. Describe quantum dot.
4. List the major steps involved in non-layer fabrication.
5. Explain the significance of characterization of nanostructure.
6. Explain the principle of atomic force microscope.
7. Describe quantum well.
8. Explain coulomb blockade.
9. Explain single electron transistor.
10. List the properties of graphene.

PART B

(Answer one full question from each module, each question carries 14 marks)

MODULE I

11. Derive Schrodinger 's equation from fundamental principles. (14)

OR

12. Differentiate between square, parabolic and triangular quantum wells. (14)

MODULE II

13. a) Explain molecular beam epitaxy. (7)
    b) Explain the significance of precipitation of quantum dots in the development of quantum dots. (7)

OR

14. a) Explain chemical vapour deposition process. (7)
    b) Explain ion implantation process. (7)

MODULE III

15. Explain the principle of operation of Scanning Tunneling Microscope. (14)

OR

16. Explain the significance of X-Ray Diffraction analysis in characterization. (14)

MODULE IV

17. a) Explain the concept of super lattice. (7)
    b) Explain how Transport of charge in Nanostructures occurs. (7)

OR

18. Enumerate the difference between - Aharonov-Bohm effect and Shubnikov-de Hass effect (14)

MODULE V

19. Explain with relevant structural diagrams the working of CNT transistors (14)

OR

20. Differentiate between quantum well laser and quantum dot laser. (14)

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