

Register No.: Name:

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

FOURTH SEMESTER B.TECH DEGREE EXAMINATION (Regular), JULY 2022**(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. Define de-Broglie wavelength and screening length in mesoscopic systems.
2. Define density of states (DoS) in a nano structures. Write the DoS expression for 2D, 1D, and 0D nanostructures.
3. Describe the basic concept of Physical Vapour Deposition for nanomaterial.
4. List the advantages of Molecular Beam Epitaxy.
5. Describe the working principle of Atomic Force Microscope.
6. Point out the reason for using X-Ray diffraction analysis for nanoparticles.
7. Illustrate the concept of modulation doping.
8. Explain hot electron.
9. Describe the working principle of quantum dot laser.
10. List any five applications of MODFET.

PART B*(Answer one full question from each module, each question carries 14 marks)***MODULE I**

11. Starting from Schrodinger equation, show that the density of states in a 1D (14) semiconductor material is directly proportional to $1/\sqrt{E}$.

OR

12. Explain quantum wells, wires and dots with figure and compare each. (14)

MODULE II

13. Illustrate thermal oxidation process. Differentiate dry and wet oxidation methods. (14)

OR

14. Explain DC sputtering method for nanomaterial deposition. Sputtering technique cannot be used for fabricating non conducting layers. Justify the statement. (14)

MODULE III

15. Illustrate different types of specimen interactions taking place in a sample during Scanning Tunnelling Microscope. (14)

OR

16. Compare Scanning Tunnelling Microscope and Atomic Force Microscope with suitable diagram. (14)

MODULE IV

17. Illustrate the working principle of operation of Resonant tunnelling diode (14)

OR

18. Explain the Aharonov-Bohm effect to induced phase variations in electron waves with the application of magnetic field with the help of diagrams and equations. (14)

MODULE V

19. Analyze the structure of Single Electron Transistor (SET) with neat diagram. (14)

OR

20. Explain the working principle of Carbon Nano Tube (CNT) transistors and list the types. (14)
