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17EC551

Fifth Semester B.E. Degree Examination, July/August 2021 Nano Electronics

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions.

- 1 a. State Moore's law. Explain its application for continued miniaturization in electronics. (10 Marks)
 b. What are various effects of nanometer length scale on semiconductor material? (10 Marks)
- 2 a. Explain the process of Molecular Beam Epitaxy with a neat sketch. (10 Marks)
 b. Compare top down and bottom up approaches. (10 Marks)
- 3 a. Briefly explain the working principle of Atomic Force Microscope with the help of a neat figure. (10 Marks)
 b. What is diffraction? Explain the two surface diffraction techniques with relevant figures. (10 Marks)
- 4 a. Evaluate Quantum confinement in Quantum well, Quantum wire and Quantum dot. (10 Marks)
 b. Write short notes on:
 (i) Super lattices
 (ii) Electronic density of state. (10 Marks)
- 5 a. Explain the following physical processes in nanostructures:
 (i) Quantum Hall effect.
 (ii) Ballistic carrier transport. (10 Marks)
 b. What is Resonant Tunneling? Explain this effect for double barrier resonant tunneling structure with relevant V-I diagram for,
 (i) No applied voltage.
 (ii) Increased applied voltage. (10 Marks)
- 6 a. Write short notes on :
 (i) Cleaned Edge over growth.
 (ii) Growth on Vicinal substrates. (10 Marks)
 b. Explain the process of Electrostatically induced quantum wires with a neat sketch. Also, mention its advantage and disadvantage. (10 Marks)
- 7 a. What are CARBON NANO TUBES? Explain various forms of carbon nano tubes. (10 Marks)
 b. Explain the wrapping arrangements of carbon nano tubes and its effect on electronic properties. (10 Marks)
- 8 a. Discuss various applications of carbon nanotubes. (10 Marks)
 b. Explain the synthesis of carbon nano tubes (CNTs) using Laser evaporation method with a figure. (10 Marks)
- 9 a. Explain the working principle of Injection laser and mention few applications. (10 Marks)
 b. Describe the working of electrochemical sensor with an example. (10 Marks)
- 10 a. Explain in detail, how quantum size affects the development of nanosensors. (10 Marks)
 b. Explain the working of nanosensor based on physical properties. (10 Marks)

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Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.