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Fifth Semester B.E. Degree Examination, Jan./Feb. 2021 Nanoelectronics

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. State Moore's law. Apply the same to explain the continued miniaturization seen in the field of electronics. (10 Marks)
- b. Distinguish the top down and bottom up approach for fabrication of Nanostructures. (10 Marks)

OR

- 2 Explain in detail Electrical, Magnetic, Optical thermal and mechanical properties of nanostructure material. (20 Marks)

Module-2

- 3 a. Mention three methods available in transformation on object to an image with neat sketch. (10 Marks)
- b. Discuss the diffraction techniques insight into the crystallography of a materials, structure of a sample system. (10 Marks)

OR

- 4 Make short note on : i) Field ion microscopy ii) Scanning tunneling microscopy. (20 Marks)

Module-3

- 5 a. Give an account of quantum hall effect and Resonant tunneling. (10 Marks)
- b. Discuss the characteristics of Semiconductor Nanostructures. (10 Marks)

OR

- 6 a. List the main requirement an ideal Semiconductor nanostructure in fabrication techniques. (10 Marks)
- b. Write a short note on : i) Modulation doping ii) Ballistic carrier transport. (10 Marks)

Module-4

- 7 a. Describe different types of carbon nanostructures. (08 Marks)
- b. Explain the different fabrication method to make carbon nanotubes with neat sketch. (12 Marks)

OR

- 8 a. Discuss the applications of carbon Nanotubes. (12 Marks)
- b. Explain the concept of superconductivity in C₆₀. (08 Marks)

Module-5

- 9 a. Write a note on injection laser and its applications. (10 Marks)
- b. Give an example of Nano Sensors based on quantum size effects. (10 Marks)

OR

- 10 a. Describe briefly Electrochemical sensors with an example. (10 Marks)
- b. Explain the working principle of Quantum cascade lasers with a neat sketch. (10 Marks)

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