

Roll No

EC - 803

B.E. VIII Semester

Examination, June, 2013

Nanoelectronics

Time : Three Hours

Maximum Marks : 100

Minimum Pass Marks :35

- Note:** i) Attempt any one question from each unit.
ii) All questions carry equal marks.

Unit 1

1. Define the following : 20
- a) Nanoelectronics.
 - b) Nanotechnology.
 - c) Top down and bottom up approach.
 - d) Energy bands in Solids.

OR

2. a) Explain how insulators, conductors and semiconductors differ with respect to energy band diagram? 10
- b) Derive the AC electrical conductivity of a metal according to Drude model. 10

Unit 2

3. Define the following : 20
- a) Quantum Wells.
 - b) Quantum Wires
 - c) Quantum dots
 - d) Nano particles.

OR

4. a) Discuss the potential energy profile for metal-insulator-metal junctions. 10
- b) Enlist and explain the applications of tunneling. 10

Unit 3

5. a) Explain what is coulomb blockade? Explain coulomb blockade in quantum dot circuit. 10
- b) Explain the formation and working of single electron transistor. (SET). 10

OR

6. a) Give an account of carbon nanotube FET. 10
- b) Explain the working principle of molecular SET. 10

Unit 4

7. a) Explain the free electron gas model of electron conduction. 10
- b) Define the following : 10
 - i) Quantum resistance and conductance.
 - ii) Electron collisions and length scales.

OR

8. a) What are the basic structure differences between carbon nanotubes and BN nanotubes? 10
- b) What are nanodiamond? Describe some of the important applications of nanodiamond. 10

Unit 5

9. a) Explain the process of VLS technique. 10
- b) What is magnetron sputtering? Explain the differences between magnetron and conventional sputtering. 10

OR

10. a) Describe various stages of a PLD process. 10
- b) Give an account of lithographic process. What are its limitations. 10