



Reg. No. :

Name :

Eighth Semester B.Tech. Degree Examination, November 2013
08.801 : NANOELECTRONICS (TA)
(2008 Scheme)

Time : 3 Hours

Max. Marks : 100



PART - A

Answer **all** questions. **Each** question carries **4** marks.

1. Define any three characteristic lengths associated with nanoelectronic devices.
2. What are the differences between evaporation and sputtering ?
3. Explain TEOS technique of SiO_2 deposition.
4. What are the merits of AFM over STM ?
5. With doping profile and energy band diagrams explain ni pi super lattice.
6. Explain the principle of resonant tunnelling. How is it different from Esaki tunnelling ?
7. Why are quantum dots considered as artificial atoms ?
8. With diagram explain how the threshold current and gain of a multiple quantum well laser depends on the number of wells.
9. Derive expression for the voltage required for tunnelling through a nanocapacitor.
10. Explain with reasons the difference in mobility of electrons in MOSFETS and MODFETS.

**PART – B**

Answer **any two** questions from **each** Module. **Each** question carries **10** marks.

Module – I

11. With a simple schematic diagram explain the principle of Molecular Beam Epitaxy for fabricating nanolayers. What are its advantages and disadvantages ?
12. Explain the principles involved in fabricating different types of nanomaterials using sol-gel technique.
13. What are the different types of electron microscopes ? With diagrams explain the principle of Scanning Electron Microscope.

Module – II

14. Compare the energy distribution and density of states in 3D, 2D, 1D and 0D materials.
15. What are the differences in the distribution of energy of electrons in multiple quantum well and superlattice ? Explain any one application of each.
16. Explain integer quantum Hall effect.

Module – III

17. With energy band diagrams explain the principle of operation of a heterojunction BJT.
18. Explain the principle of operation and characteristics of a quantum dot based, single electron transistor.
19. With structural details explain the principle of operation of a quantum dot laser. What are its advantages and disadvantages ?