Reg. No. : ....

Name : ....

Eighth Semester B.Tech. Degree Examination, April 2014
(2008 Scheme)
08.801 : NANOELECTRONICS (TA)
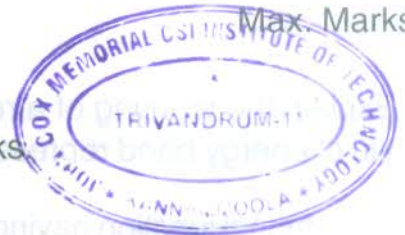
Time : 3 Hours   Max. Marks : 100

PART – A

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

1. Explain the principle of operation of STM.

2. List the advantages and disadvantages of ion implantation process.

3. Explain the sol-gel process for nanoparticle formation.

4. Write notes on any four characteristic lengths in mesoscopic systems.

5. Explain the concept of zone folding in superlattices.

6. Write notes on the different scattering mechanisms for parallel transport in semiconductor nanostructures.

7. What do you mean by Coulomb Blockade Effect ? What are the conditions to be met in order to observe coulomb blockade ?

8. With the help of energy band diagram, explain the different types of carrier sub band transitions in quantum well infrared photo detectors.

9. Explain the Shubnikov-de Hass Oscillation Effects.

10. Draw the gain spectrum for the ideal bulk, quantum well, quantum wire and quantum dot lasers and compare.

PART – B

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

Module – I

11. With the help of a schematic diagram, explain the process of Molecular Beam Epitaxy.

12. Explain the principle of operation of a TEM.

13. Explain any two physical vapour deposition processes.

Module – II

14. Explain Kronig-Penney model of a superlattice. What is meant by zone folding ?

15. Explain Integer Quantum Hall Effect (IQHE).

16. Compare and contrast parabolic potential well and triangular potential well.

Module – III

17. Explain the working of a resonant tunneling hot electron transistor, with the aid of energy band representation.

18. For a tunnel junction having $C = 0.5\,aF$ and $Rt = 100\,K\Omega$, what is the maximum temperature at which you would expect to find coulomb blockade.

19. MODFETs are known as 'high electron mobility transistor'. Justify with the help of energy band diagram.