# Eighth Semester B.Tech. Degree Examination, April 2016 (2008 Scheme)

08.801: NANOELECTRONICS (TA)

Max. Marks: 100 Time: 3 Hours

## PART-A

Answer all questions. Each question carries 4 marks.

- 1. Draw the structure of HEMT. Give its features.
- 2. Explain resonant tunnel effect.
- 3. Mention four advantages of vertical cavity surface emitting lasers.
- 4. Explain the formation of electron avalanche in an APD under light irradiation.
- 5. List the benefits of using carbon nanotubes for AFM tips.
- 6. Explain the reasons for the wide range of properties of materials containing carbon.
- Explain sol-gel process.
- 8. Differentiate between quantum well and quantum dot.
- 9. What are the attractive features of heterostructures?
- Explain Electron-photon scattering mechanism in parallel transport.

 $(10\times4=40 \text{ Marks})$ 

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#### PART-B

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

#### Module - I

- 11. Explain briefly the principle of lon Implantation.
- 12. Describe the structure and operation of Molecular Beam Epitaxy.
- 13. With a schematic diagram, describe the principle of scanning tunneling Microscope.

### Module - II

- 14. Explain quantum transport in nanostructures and give Landauer formula.
- 15. Draw the band diagram of a MOS-structure with positive bias on the gate and explain.
- 16. Write a brief description about parabolic and triangular wells.

#### Module - III

- 17. With relevant diagrams, explain the IV characteristics of resonant tunnel diode.
- 18. Describe the working principle of single-electron transistor.
- 19. Explain the principle of operation of quantum well laser. ( $6 \times 10 = 60 \text{ Marks}$ )

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