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Reg. No. : .....

Name : .....

Eighth Semester B.Tech. Degree Examination, February 2021

08.801 NANOELECTRONICS (TA)

(2008 Scheme)

Time : 3 Hours Max. Marks : 100

PART – A

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

1. Explain laser ablation method for nano particle fabrication.

2. Consider an electron having kinetic energy 5eV and effective mass $0.511m_0$. Calculate its De-Broglie wavelength. If the size of the mesoscopic structure having the electron is in the range of 2×10^{-14}m, will it fall in the category of nanostructures?

3. DC sputtering cannot be used for coating of non-conducting materials. Justify. Explain how RF sputtering overcome this advantage.

4. Explain the different scattering events encountered by a carrier during parallel transport under the influence of electric field.

5. Explain Shubnikov – de Hass effect.

6. Differentiate between multiple quantum wells and super lattice.

7. Illustrate resonant tunneling effect.

P.T.O.

8. MODFETs are high electron mobility transistors. Justify.

9. Explain the working of a quantum dot Laser.

10. Explain the principle of carbon nanotube transistors.

(10 × 4 = 40 Marks)

PART – B

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

Module I

11. Explain the Sol — Gel process for fabricating different types of nanomaterials.

12. Illustrate the principle of operation of a TEM. Explain the different imaging modes in TEM.

13. Explain any two physical vapour deposition processes, with the aid of diagrams.

(2 × 10 = 20 Marks)

Module II

14. Show that density of states in a 2D material is independent of energy.

15. Explain Kronig- Penny model of a super lattice. Explain the concept of zone folding.

16. Explain

    (a) Aharonov Bohm effect.

    (b) Quantum Hall effect.

(2 × 10 = 20 Marks)

Module III

17. Explain the conditions to be fulfilled in order to observe single electron effect. Explain the principle of operation of a quantum dot based single electron transistor.

18. Illustrate the working of a resonant tunneling hot electron transistor, with the aid of energy band diagrams.

19. List the desirable properties of BJT and explain how this is achieved in heterojunction transistors.

(2 × 10 = 20 Marks)