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10NT62

Sixth Semester B.E. Degree Examination, June/July 2017

Nano Electronics and Devices

Time: 3 hrs. Max. Marks:100

Note: ***Answer FIVE full questions, selecting at least TWO questions from each part.***

PART – A

1 a. Explain transition of silicon MOS transistor from micro to nano and future opportunities. **(10 Marks)**

b. Write short notes on silicon electronics and nano computing. **(10 Marks)**

2 a. Write short notes on :
i) Gate-oxide tunneling
ii) Hot electron effects in MOSFETs
iii) Double barrier tunneling
iv) Resonant tunneling diode. **(12 Marks)**

b. Explain the potential energy profiles for material interfaces taking metal insulator and metal semiconductor junctions. **(08 Marks)**

3 a. What is coulomb blockade? Explain the tunnel junction excited by a current source. **(10 Marks)**

b. Write short notes on coulomb blockade, coulomb blockade in a quantum dot circuit and single electron transistor. **(10 Marks)**

4 a. Explain in detail about molecular devices, logic switches and interface engineering. **(12 Marks)**

b. Derive Schrodinger equation for time dependent and time independent equation in detail. **(08 Marks)**

PART – B

5 a. Write a brief note on Monte Carlo method. **(10 Marks)**

b. What is ab initio method? Write a note on multiscale modeling. **(10 Marks)**

6 a. Define bio-sensor and explain in detail about different types of biosensor classified based on biological signaling. **(10 Marks)**

b. Explain any five physical effects involved in signal transduction briefly. **(10 Marks)**

7 a. Explain briefly about strain sensors along with half wave and full wave strain gauge configuration with proper circuit and equation. **(10 Marks)**

b. Explain different operating modes of sensors. **(10 Marks)**

8 a. Write short notes on following:
i) Temperature sensors
ii) Chemical sensors **(10 Marks)**

b. Explain briefly about optical and radiation sensors and gas sensor. **(10 Marks)**

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