No. of Printed Pages : 2

BIELE-007

B.Tech. – VIEP – ELECTRONICS AND COMMUNICATION ENGINEERING (BTECVI)

Term-End Examination

00696

December, 2014

BIELE-007 : NANO-ELECTRONICS

Time : 3 hours *Maximum Marks : 70*

Note : *Attempt any **seven** questions. All questions carry equal marks.*

1. Discuss the following issues for nanoscale MOSFET technology : *10*

(a) Non-uniform dopant concentration

(b) Hot-electron effects

2. (a) Discuss the challenges in nano-electronics for fabrication of nano devices. *5*

(b) What are the fundamental limits for MOS operation ? *5*

3. Explain the various steps for making a SILICON ON INSULATOR (SOI) wafer with diagram. *10*

4. (a) What are the various design trade-offs related to parameters like width, height and pitch in FinFETs ? *5*

(b) Explain multigate MOSFET. How is leakage eliminated in this technology ? *5*

5. What is quantum well ? Solve the Schrodinger equation for an infinitely deep quantum well of width L to find eigenfunctions and eigenvalues. *10*

6. What are heterojunctions ? Discuss Si-Ge heterostructure with their energy band diagram. *10*

7. (a) What are resonant tunneling devices (RTD) ? Explain their operation. *5*

   (b) What are the operational trade-offs of RTD ? What are the advantages of RTD ? *5*

8. Explain type I, II and III heterojunctions with their energy band diagrams. *10*

9. Discuss the structures of arm-chair, zig-zag and chiral single walled carbon nano tubes (CNT). Explain one synthesis method for CNT in detail and also discuss their important applications. *10*

10. Write short notes on any ***two*** of the following : *2×5=10*

    (i) Spintronics

    (ii) Coulomb-blockade

    (iii) Strained Si-devices

    (iv) Threshold voltage scaling
