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BIELE-007

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

Term-End Examination

00272

December, 2016

BIELE-007 : NANO-ELECTRONICS

Time : 3 hours *Maximum Marks : 70*

Note : *Attempt any **seven** questions. All questions carry equal marks. Missing data, if any, may be suitably assumed and stated.*

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1. Define the following terms : $4 \times 2\frac{1}{2} = 10$

(a) Velocity saturation

(b) Hot-electron effect

(c) Threshold voltage scaling

(d) Interconnect issues

2. Explain the operation of the following : $5+5=10$

(a) Multigate MOSFETs

(b) FinFETs

3. With reference to quantum structures, explain the relevance of the following : $5+5=10$

(a) Quantum Wires

(b) Quantum Dots

4. Explain the concept of charge quantization and energy quantization. *5+5=10*

5. Give the energy band diagram of a Si-Ge heterostructure and explain its operation using the energy band structure. *10*

6. Draw the energy band structures of the following : *5+5=10*

   (a) III – V compounds

   (b) II – VI compounds

7. Explain the operation of a resonant tunneling transistor. *10*

8. What are strained Si devices ? Explain their operation and give their characteristics. *10*

9. Write short technical notes on any ***two*** of the following : *5+5=10*

   (a) CNFET

   (b) Coulomb Staircase

   (c) Single Electron Devices

   (d) Vertical MOSFETs