

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

Term-End Examination

00134

June, 2017

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 assumed and stated.

1. What are the challenges faced by the designers in moving to sub-100 nm MOSFETs ? Explain. 10

2. Explain the various fundamental limits associated with the operation of MOSFETs. 10

3. What do you understand by the following terms ?
Explain them. 5+5=10
 - (a) Silicon-on-Insulator (SOI)
 - (b) Silicon-on-Nothing (SON)

4. Explain with the help of a neatly labelled diagram and mathematical relations, the operation of vertical MOSFETs. 10

5. Explain in detail the operation of a single electron device. 10
6. What are heterostructure based devices ? What are the different types of heterojunctions ? Explain them in brief. 10
7. Explain in detail the operation of a resonant tunnelling diode. 10
8. Explain the basic operation of carbon nano-tube based devices. Give in brief the properties and characteristics of a carbon nano-tube field-effect transistor (CNFET). 10
9. Write short technical notes on any *two* of the following : 5+5=10
- (a) Si-Ge Heterostructure
 - (b) Coulomb Blockade
 - (c) Interconnect Issues
 - (d) Energy Quantization
 - (e) SpinFET
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