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No. of Printed Pages : 3

BIELE-002

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

Term-End Examination

December, 2015

BIELE-002 : MICROELECTRONICS TECHNOLOGY

Time : 3 hours *Maximum Marks : 70*

Note : *Attempt any* ***seven*** *questions. Assume suitable missing data, if any. Use of scientific calculator is permitted.*

1. (a) Explain the crystal growing theory of single crystal silicon.

(b) Describe the Float-Zone process of crystal growth. *5+5*

2. (a) What is epitaxy ? What are the characteristics of epitaxial growth ?

(b) Explain the Molecular Beam Epitaxy method by drawing its schematic diagram. *5+5*

3. (a) Explain the growth mechanism and kinetics of oxidation using Deal and Grove's model.

(b) What is the difference between thin oxide and thick oxide ? Write their properties. *7+3*

4. (a) What is the use of Lithography in IC Fabrication Technology ?

(b) What is photo-resist ? Give its classification with some examples.

(c) Explain the Optical Lithography process using a suitable diagram. *2+3+5*

5. (a) Differentiate between Dry Etching and Wet Etching process.

(b) Explain the RIE technique of Etching process. *5+5*

6. (a) Derive Fick's one-dimensional diffusion equations and find the expression of constant diffusivities and its temperature dependency.

(b) What is sheet resistance ? How do you find the sheet resistance of a diffused layer ? *6+4*

7. (a) Explain the range theory of ion-implantation.

(b) A 100 keV boron atom makes a head-on collision with a silicon atom. Use an unscreened Coulomb potential to estimate the closest distance the atoms come to each other during the collision. How much energy does the boron atom lose during the collision ? *5+5*

8. (a) What are the metallization applications ? Enlist them.

(b) Calculate the percent of molecules that suffer collisions during travel from a source to the substrate in a deposition system at 0·5 Pa and 10^{-4} Pa. The source-to-substrate distance is 50 cm. Assume a typical molecular diameter of 3 Å. *5+5*

9. What are the fundamental processes for IC fabrication technique ? Explain with suitable diagrams. *10*

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

(a) Differentiate between MOS and Bipolar IC Processing

(b) NMOS IC Technology

(c) Electro-migration