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BIELE-002

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

Term-End Examination

00119

June, 2015

BIELE-002 : MICROELECTRONICS TECHNOLOGY

Time : 3 hours *Maximum Marks : 70*

Note : *Attempt any **seven** questions. Assume suitable missing data, if required. Use of scientific calculator is allowed. All questions carry equal marks.*

1. (a) Explain the Czochralski crystal growth process using suitable diagram.

(b) A boron-doped crystal is measured at its seed end with a four-point probe of spacing 1 mm. The (V/I) reading is 10 Ω. What is the seed end doping and the expected reading at 0·95 fraction solidified ? [Solid Concentration = 2×10^{15} atoms/cm^3, $K_o = 0{\cdot}8$] *7+3=10*

2. (a) Explain the process of silicon shaping.

(b) Explain the basic transport processes and reaction kinetics of Vapour-phase epitaxy. *5+5=10*

3. (a) What is the difference between wet oxidation and dry oxidation ?

(b) Discuss the growth mechanism and kinetics of oxidation using Deal-Grove model. *5+5=10*

4. Explain the process of Photo Lithography. Differentiate between Photo and Electron Lithography process. *10*

5. (a) Explain the Reactive Plasma Etching process. Describe the properties of plasma.

(b) Discuss the wet etching process with required diagram. *6+4=10*

6. (a) Derive the diffusion equations for the diffusion process associated with constant surface concentration and constant total dopant.

(b) Define diffusion process. What are the different steps of diffusion process ? *6+4=10*

7. Describe the range theory of ion-implantation. What are the limitations associated with the ion-implantation system used in IC fabrication technology ? *10*

8. (a) Discuss the process of physical vapour deposition used for metallization process.

(b) What are the metallization problems associated with deposition, processing and electromigration ? *5+5=10*

9. (a) Discuss the fabrication process sequence of twin-tub CMOS structure using suitable diagrams.

(b) What are the fundamental considerations for IC processing ? *5+5=10*

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

(a) Float-Zone Process of Crystal Growth

(b) Wet vs Dry Etching Comparison

(c) Multi-level Metallization