

Roll No. ....

Total Pages : 03

**BT-5/D-18                      35009**  
**MICROELECTRONICS**  
**ECE-309E**  
**(Opt. ii)**

Time : Three Hours]

[Maximum Marks : 100

**Note :** Attempt *Five* questions in all, selecting at least *one* question from each Unit.

**Unit I**

1. (a) Draw the schematic diagram of the production of electronic grade silicon from the hydrogen reduction of trichlorosilane. 10
- (b) Write DC sputtering thin film deposition technique and its limitations. 10
2. Describe any *four* of the following : 20
  - (a) Oxidation Induced Defects
  - (b) Orientation dependence oxidation rate
  - (c) Oxide Charges
  - (d) Epitaxial Defects
  - (e) Why Boron concentration at tail end in CZ grown crystals is larger than seed end ?

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**Unit II**

3. (a) Explain X-ray source, X-ray mask and photo resist challenges for lithography of VLSI circuits. 10
- (b) Describe various oxide charges, its effect on device performance, and techniques to minimize its effects. 10
4. (a) Describe AC Plasma excitation and explain etch rate of Silicon in  $CF_4 + O_2$  plasma with percentage  $O_2$  concentration. <http://www.kuonline.in> 10
- (b) Describe E-beam lithographic technique for pattern writing and mask making. 10

**Unit III**

5. (a) Describe Channeling and methods to stop channeling and also significance of post-implant annealing. 10
- (b) Discuss diffusion profile measurement techniques. 10
6. (a) Explain basic diffusion mechanism in solids, and Fick's law of diffusion and its solution for the Constant total dopant's. 10
- (b) Describe Ion implantation and range theory. 10

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#### Unit IV

7. Write short notes on the following :
- (a) Double diffusion BJT IC fabrication process sequence **10**
  - (b) Dielectric Isolation **5**
  - (c) Constraints in MEMS packaging. **5**
8. Write short notes on any *four* of the following :
- (a) Twin tub CMOS fabrication technology and mask requirements
  - (b) Describe various package design considerations
  - (c) Trench Isolation Technique
  - (d) Semi-recessed LOCOS and bird's beak encroachment
  - (e) Bipolar IC fabrication in brief. **20**

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