

Roll No.

Total Pages : 04

BT-5/D-18

35110

VLSI TECHNOLOGY

ECE-305N

Time : Three Hours]

[Maximum Marks : 75

Note : There are eight questions in all organized in four sections and each section is having two questions from each of the four Units. Attempt *Five* questions in all, selecting at least *one* question from each Unit.

Unit I

1. (a) Explain briefly the steps involved in wafer preparation after the growth of crystal. 8
(b) Explain briefly the fabrication steps of $p-n$ diode. 7
2. (a) What is the significance of clean room ? Is there any classification for the clean room ? Explain. 4
(b) What do you understand by surface contamination ? How are these harmful ? What should we do to remove these ? 6

- (c) Why the isolation is required between adjacent devices ? Explain, how it can be accomplished ? 5

Unit II

3. (a) Explain the growth techniques and kinetics of this oxide growth. What are the important properties exhibited by thin oxides ? 6
- (b) Why pre-oxidation cleaning is required ? How can it be done ? 4
- (c) What do you understand by oxide stress ? Why is it important to deal with this oxide stress ? Explain the remedies required for this. 5
4. (a) What are the factors responsible for the redistribution of dopants at the interface after oxide growth ? Explain. 6
- (b) What are important properties of wet oxidation and dry oxidation ? 4
- (c) How many basic isolation techniques used in VLSI circuits ? Explain with suitable diagram. 5

Unit III

5. (a) Diffusion is basically an atomic movement of diffusants in crystal lattice. Which atomic diffusion models are followed by the diffusion process ? Illustrate with diagrams and expressions the complete diffusion process. 10
- (b) Explain, how ion implantation is different from diffusion techniques used for the insertion of dopants into the substrate. 5
6. (a) What is the importance of ion-stopping mechanism ? How many ion-stopping mechanisms are there ? Explain. 8
- (b) What is the significance of annealing ? What do you understand by annealing temperature ? Explain, how the annealing temperature affects the dose of dopants ? 7

Unit IV

7. (a) Why lithographic exposure tool is used ? Explain which parameters decide the performance of exposure tool ? Describe the optical exposure methods in detail. 8

- (b) Explain with suitable diagrams the NMOS fabrication process steps. 7
8. (a) How many types of CVD techniques are used for metallization ? Explain APCVD. 5
- (b) What do you understand by Lift-off technique ? State the difference between optical lithography and lift-off technique with the help of pattern transfer diagrams. 7
- (c) Draw the basic fabrication process steps for the Schottky diode. 3

