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B. TECH
(SEM-V) THEORY EXAMINATION 2021-22
VLSI TECHNOLOGY

Time: 3 Hours**Total Marks: 100****Note: 1.** Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. 2 x 10 = 20

- a. Discuss oxide charges.
- b. What is electronic grade silicon.
- c. Explain the purpose of oxidation.
- d. How is wafer polishing done?
- e. What are positive and negative photoresist?
- f. What are the disadvantages of Electron Beam Lithography?
- g. What are the basic mechanisms of diffusion?
- h. State Fick's second law of diffusion.
- i. Why is metallization done?
- j. What is the disadvantage of Sputtering?

SECTION B

2. Attempt any *three* of the following: 10 x 3 = 30

- a. Explain Czochralsky method of single crystal generation in detail.
- b. Explain Plasma Oxidation technique for the growth of oxide layer.
- c. Explain Chemical Vapor Deposition process.
- d. Demonstrate various diffusion profiles of dopant atom with appropriate equations and curves and compare them.
- e. What are the disadvantages of using Aluminum for metallization? How are they rectified?

SECTION C

3. Attempt any *one* part of the following: 10 x 1 = 10

- (a) Explain Float-Zone method of single crystal generation.
- (b) Demonstrate RCA cleaning with analysis of all steps and chemicals.

4. Attempt any *one* part of the following: 10 x 1 = 10

- (a) Explain Molecular Beam Epitaxy process in detail. Also write the advantages and disadvantages of this method.
- (b) Explain Deal-Grove's model for oxidation kinetics.



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5. **Attempt any *one* part of the following:** **10 x 1 = 10**
(a) Explain the process of Electron Beam Lithography. Write down figures of merit of Lithographic process.
(b) Explain the process of polysilicon film deposition.
6. **Attempt any *one* part of the following:** **10 x 1 = 10**
(a) Determine total doping concentration, junction depth and doping profile in case of infinite source of diffusion.
(b) Explain Ion-Implantation process, its advantages and disadvantages.
7. **Attempt any *one* part of the following:** **10 x 1 = 10**
(a) Explain CMOS fabrication steps in detail.
(b) Briefly explain Vacuum Deposition and Sputtering for metallization.