

- Q. 4(a) Explain how rapid thermal annealing (RTA) helps in dopant activation and defect repair. (7)
- (b) Describe the process and kinetics of thermal oxidation of silicon (7)
- (c) How does Ion Implantation technique help to control the doping profile? (4)
- Q. 5(a) Summarize the wafer fabrication sequence from substrate cleaning to metallization. (7)
- (b) Explain stamp-based printing and Laser transfer pattern transfer methods used in fabrication process. (7)
- (c) What is meant by Advanced Process Integration? (4)
- Q. 6 (a) Explain the electron beam evaporation technique used for thin film deposition. (7)
- (b) What is Reactive Ion Etching (RIE) process? Explain its advantages over other available etching processes. (7)
- (c) What are different sources of contamination in clean room? (4)
- Q. 7 (a) What are the different Ion Implantation techniques used in semiconductor fabrication? Explain any two of them. (7)
- (b) Explain Atomic Layer Deposition (ALD) technique used for thin film deposition along with its advantages over other available techniques. (7)
- (c) What are Multiple Patterning and Self-Alignment techniques in advanced lithography? (4)

[This question paper contains 2 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 9494

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Unique Paper Code : 2513040019

Name of the Paper : VLSI Fabrication Technology

Name of the Course : **B.Sc. (H) Instrumentation (DSE)**

Semester : VII

Duration : 3 Hours

Maximum Marks : 90

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt **five** questions in all. Question No. 1 is compulsory.
3. **All** questions carry equal marks.
4. Use of Non programmable Scientific Calculator is allowed.

- Q1.(a) What is the principle behind Interference lithography? (3)
- (b) What are the main stages in the evolution from SSI to VLSI? (3)
- (c) Differentiate between wet oxidation and dry oxidation of silicon. (3)
- (d) Differentiate between positive and negative photoresist in the lithography process. (3)
- (e) What is Sputtering? Explain its basic working principle. (3)
- (f) Define photomask and reticle. How do they differ? (3)
- Q2. (a) Explain how Moore's Law has driven advanced device scaling, detailing its role in shrinking transistor dimensions and reducing cost per transistor. (7)
- (b) Explain the key safety measures that must be followed by personnel in a cleanroom environment to protect themselves and maintain contamination control. Include precautions related to clothing, handling of chemicals, equipment uses, and emergency procedures. (7)
- (c) State the importance of yield in semiconductor manufacturing. (4)
- Q3 (a) What is Lithography? Explain the Nanoimprint lithography. (7)
- (b) Describe the working principle of X-ray lithography and discuss its major advantages and challenges in modern semiconductor fabrication. (7)
- (c) What is PECVD technique and where is it used? (4)

P.T.O.