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B TECH
(SEM-V) THEORY EXAMINATION 2020-21
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

Qno.	Question	Marks	CO
a.	Explain the terms: SSI, LSI, MSI and VLSI.	2	1
b.	Define the crystal structure of Silicon.	2	1
c.	What are point defects?	2	1
d.	What is meant by annealing?	2	2
e.	Mention cardinal rules for hetero epitaxy.	2	2
f.	State the purpose of oxidation.	2	3
g.	Differentiate between positive and negative photoresist.	2	4
h.	Why is aluminum preferred for metallization?	2	5
i.	Mention various packaging types available for IC fabrication.	2	5
j.	What do you mean by SOI?	2	3

SECTION B

2. Attempt any three of the following:

3 x 10 = 30

Qno.	Question	Marks	CO
a.	Describe CZ process in detail with neat diagram. Mention the importance of inert ambient during the process.	10	1
b.	Explain the different types of deposition reactors used for VPE.	10	2
c.	Explain the process of e-beam lithography with the help of suitable diagram. Mention its advantages over optical lithography.	10	3
d.	State and derive diffusion equation in case of limited source. Also explain the diffusion profile with the help of suitable graph.	10	4
e.	What are the different package types used for VLSI devices? What are different packaging design considerations?	10	5

SECTION C

3. Attempt any one part of the following:

a.	Explain production process of Electronic Grade Silicon from silica with neat diagram.	10	1
b.	Discuss different operations involved in preparation of wafers using schematic diagram.	10	1

4. Attempt any one part of the following:

a.	Explain molecular beam epitaxy. What are the advantages offered by it over vapor phase epitaxy?	10	2
b.	Explain the chemistry and kinetics of growth using Deal & Grove's Model.	10	2

5. Attempt any one part of the following:

a.	What is wet chemical etching? Explain how etching reaction take place by using HNA. Mention the purpose of each acid in it.	10	3
b.	Describe the process of optical lithography. Classify optical lithography based on placement of wafer and mask.	10	3

6. Attempt any one part of the following:

a.	Explain the mechanism of diffusion. State and derive Fick's first law of diffusion. Also, derive Fick's second law from the first law.	10	4
b.	What is Ion-implantation? Why is ion-implantation preferred over diffusion for impurity doping? Explain briefly ion-implantation technique with a labeled sketch.	10	4

7. Attempt any one part of the following:

a.	Elaborate the various steps of CMOS fabrication with diagram and explanation.	10	5
b.	Explain vacuum evaporation technique of metallization.	10	5