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NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute)

Affiliated to Dr. A.P.J. Abdul Kalam Technical University, Uttar Pradesh, Lucknow

M.Tech

SEM: I - THEORY EXAMINATION (2021 - 2022)

Subject: Microchip Fabrication Technology

Time: 03:00 Hours

Max. Marks: 70

General Instructions:

1. All questions are compulsory. It comprises three Sections A, B and C.
 - Section A - Question No- 1 is objective type question carrying 1 mark each & Question No- 2 is very short type questions carrying 2 marks each.
 - Section B - Question No- 3 is Long answer type - I questions carrying 4 marks each.
 - Section C - Question No- 4 to 8 are Long answer type - II questions carrying 7 marks each.
 - No sheet should be left blank. Any written material after a Blank sheet will not be evaluated/checked.

SECTION A

15

1. Attempt all parts:-

- | | | |
|------|---|---|
| 1-a. | The active components in an IC are (CO1) | 1 |
| | <ol style="list-style-type: none"> 1. Transistors & diodes 2. Capacitors 3. Registers 4. None of these | |
| 1-b. | Silicon oxide is patterned on a substrate using _____ (CO2) | 1 |
| | <ol style="list-style-type: none"> 1. Physical lithography 2. Chemical lithography 3. Photolithography 4. Mechanical Lithography | |
| 1-c. | What is next step after Photolithography? (CO3) | 1 |
| | <ol style="list-style-type: none"> 1. Oxidation 2. Diffusion 3. Metallization 4. Orientation | |
| 1-d. | Choose the incorrect step involved in PVD technique. (CO4) | 1 |
| | <ol style="list-style-type: none"> 1. Physical ejection of material as atom or molecules 2. Chemical reaction takes place during the deposition 3. Nucleation of the atoms or molecules 4. Condensation of the atoms or molecules | |
| 1-e. | Deposition rate is given as (CO5) | 1 |
| | <ol style="list-style-type: none"> 1. width per unit time 2. thickness per unit time 3. sputtering rate per unit time 4. depositing rate per unit time | |

2. Attempt all parts:-

- | | | |
|------|---|---|
| 2-a. | Identify three trends that have driven the semiconductor industry. (CO1) | 2 |
|------|---|---|

2-b.	What do you mean by wafer preparation? (CO2)	2
2-c.	What are the differences between positive and negative photo resist? (CO3)	2
2-d.	What two factors must be present for chemical vapor deposition success? (CO4)	2
2-e.	Why aluminium is preferred for metallization? (CO5)	2

SECTION B

20

3. Answer any five of the following:-

3	State the stage of processing in which wafers are produced. (CO1)	4
3	List the reasons why silicon is the most common semiconducting material. (CO1)	4
3	Explain layering and patterning technique of wafer fabrication operations. (CO2)	4
3	Explain different types of oxidation methods. (CO2)	4
3-e.	Give some differences between Hard Baking and Soft Baking. (CO3)	4
3-f.	Write a short note on Vapour phase Epitaxy. (CO4)	4
3-g.	Differentiate between Through Hole and Surface mount technology. (CO5)	4

SECTION C

35

4. Answer any one of the following:-

4	Sketch Float zone method. Write its advantages & disadvantages. (CO1)	7
4	Sketch the CZ process and explain its various parts. Also write its advantages and disadvantages. (CO1)	7

5. Answer any one of the following:-

5.a	Explain the preparation of wafers from the crystal ingot. (CO2)	7
5.b	Differentiate among thermal, rapid thermal and high pressure oxidation method. (CO2)	7

6. Answer any one of the following:-

6	Explain the process of etching in detail with suitable diagram. (CO3)	7
6	Discuss Pattern Transfer Defects in detail. (CO3)	7

7. Answer any one of the following:-

7	Derive expressions for Fick's Second Law of Diffusion. (CO4)	7
7	Sketch the schematic diagram of CVD Reactors and explain its working. (CO4)	7

8. Answer any one of the following:-

8	Explain Ceramic Package Technology. With the help of neat diagram discuss the process sequence of a multilayer ceramic technology to create a laminated refractory ceramic product. (CO5)	7
8	Explain the various aspect of thermal and electrical packaging design consideration. (CO5)	7