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B. TECH
(SEM-VI) THEORY EXAMINATION 2018-19
INTEGRATED CIRCUIT 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. Define the term: Epitaxial Growth.

b. What is Etching? Define Wet etching.

c. Define LSI, MSI, VLSI, and ULSI on number of transistor basis?

d. Explain the purpose of oxidation.

e. Explain the term: Photo-mask and Photo-resist.

f. List the advantage of Ion Implantation?

g. Why aluminium is preferred for metallization?

h. What is Packaging?

i. List the advantages of Monolithic Integrated circuit over distributed integrated circuits.

j. What is Auto Doping?

SECTION B

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

a. What is molecular beam Epitaxy? Explain with neat diagram.

b. Discuss diffusion. Find diffusion constants for:
(i) Interstitial Diffusion, (ii) Substitutional Diffusion.

c. What do you mean by silicon on insulator? Explain in details about SOI,SOS and Silicon on amorphous material.

d. How a NPN transistor can be fabricated? Explain all the steps of fabrication. Also compare it with NMOS fabrication.

e. Write short note on package types and packaging design VLSI technology. What do you mean by DIP? Explain.

SECTION C

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

(a) Explain the C-Z technique for crystal growth with neat diagram.

(b) Discuss different shaping operations involved in Preparing Wafers with diagram.

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

(a) Discuss all four types of deposition reactors with advantages and disadvantages.

(b) What is Ion-implantation? Why ion-implantation is preferred over diffusion for Impurity doping? Explain briefly ion-implantation technique with a labeled sketch.

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

(a) Derive the Fick's one dimensional diffusion equation. Also explain the constant diffusivity and concentration, temperature dependency of diffusivity in terms of Fick's Equation.

(b) What do you mean by film deposition? Explain different types of films deposited in IC fabrication.

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

(a) Give the fabrication sequence of CMOS IC Technology. Also provide the information of different design considerations while CMOS IC fabrication in detail.

(b) Explain, why sputtering is needed for the deposition of refractory materials like Tantalum. With neat diagram explain the D.C. sputtering technique.

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

(a) (i) Describe “Dopant Profiles” in brief.
(ii) What is latch up? How latch up is avoided in CMOS technology?

(b) Explain Monolithic and Hybrid Integrated Circuits with example.