Paper Code: MEC 906 **Roll No.** | | | | | | | | | | |

M.Tech.
(SEM I) ODD SEMESTER EXAMINATION2015-16
VLSI Technology

[Time: 3 hrs.] **[Max. Marks: 100]**

Note- ***Attempt All Questions. All Questions carry equal marks*:-**

1. **Attempt any FOUR of the following questions:** **5x4=20**

(a) What are the different types of oxidation?Explain with diagram thermal oxidation method.

(b) Show that to grow an oxide of thickness x, a thickness of 0.44x of silicon is consumed.

(c) Mention different growth technologies of thin oxides and describe any one technique in detail.

(d) Compare ion implantation process with diffusion.

(e) A proximity printer operates with 10 µm mask-wafer gap, and a wavelength of 430nm. Another printer uses a 40 µm gap with wavelength 250 nm. Which of offer higher resolution?

(f) Explain all properties of etchants.

2. **Attempt any FOUR of the following questions:** **5x4=20**

(a) What is the role of clean room in IC fabrication process? Explain the classification and design layout.

(b) Explain proximity printing and projection printing and compare these two.

(c) With neat sketches, explain in detail, all the steps involved in electron lithography process.

(d) Explain high k and low K dielectrics used for ULSI?

(e) Explain chemical vapor depositions techniques used for deposition of polysilicon.

(f) What is the failure rate in metal interconnects? How it can be reduced.

3. **Attempt any TWO of the following questions:** **10x2=20**

(a) Explain the metallization and also describe the problems associated with the process. Explain dc sputtering method of metallization.

(b) Write the steps involved in IC fabrication process. Explain the following terms related to the fabrication of IC :(a) Diffusion (b) Oxidation (c) Lithography (d) Metallization

(c) (i) What are the steps involved in the nMOS fabrication?

(ii) In what way PMOS fabrication is different from nMOS fabrication.

iabhayrp.in

(iii) Which fabrication is preferred and why? What are the processes involved in photo lithography, explain in detail.

4. Attempt any TWO of the following questions: 10x2=20

(a) Describe the masking sequence and process flow for BIPOLAR devices.

(b) Explain the effect of impurities and damage on the oxidation rate.

(c) Compare the oxide thickness grown for short time and long time oxidation at a temperature of 1200 ^{o}C by wet oxidation method. At 1200 ^{o}C, A= 0.05μm and B =0.720μm^2/h, τ=0.

5. Attempt any TWO of the following questions: 10x2=20

(a) Boron is diffused in silicon with a doping concentration of 10^{16} atom/cm^3 which assumes Gaussian profile. Boron is diffused for 1 hr and a junction depth of 10 μm is achieved with surface concentration of 8×10^{17}/cm^3. Find the diffusivity of boron.

(b) What do you mean by annealing and why it is required in IC fabrication process?

(c) What is the purpose of masking in fabrication of IC and what are the materials used for masking? Explain wet etching process.

iabhayrp.in