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NEC-603

(Following Paper ID and Roll No. to be filled in your Answer Books)

Paper ID : 131613

Roll No.

B. TECH.

Theory Examination (Semester-VI) 2015-16

INTEGRATED CIRCUIT TECHNOLOGY

Time: 3 Hours

Max. Marks: 100

Section-A

- Q1. Attempt all parts. All parts carry equal marks. Write answer of each part in short. (2×10=20)
 - (a) List the basic process for IC fabrication.
 - (b) Explain the purpose of oxidation.
 - (c) Compare proximity printing and projection printing.
 - (d) What are plasma deposition reactors? Why and how these are used?
 - (e) What are the widely used materials for film deposition.
 - (f) Explain photomask and photoresist.

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(1)

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- (g) What are the factors effecting the etch rate?
- (h) What is auto doping in growth process?
- (i) Mention the advantages of Integrated circuits.
- (j) Why aluminium is preferred for metallization.

Section-B

Q2. Attempt any five questions from this section. $(10 \times 5 = 50)$

- (i) What is Fick's law of diffusion? Boron is diffused into an n-type single crystal substrate with doping conc. of 10¹⁵ atm/cm³. Assume diffusion function to be Gaussian, if diffusion time is 1hr, surface conc.=1×10¹⁸/cm³ and depth of junction is 2μm, determine diffusivity.
 - (ii) Explain ion implantation and mention its advantages over diffusion.
- (b) Why oxidation is done? Explain the chemistry and kinetics of growth using Deal Groves Model.
- (c) (i) What is latch up? How latch up is avoided in CMOS technology?
 - (ii) Describe "Dopant Profiles" in brief.

(2)

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- (d) Define thin film. Describe the vacuum evaporation technique for deposition of thin films used in integrated circuit technology.
- (e) (i) What is epitaxial growth? What are the advantages of epitaxial process over diffusion and Czochralski process.
 - (ii) Define sheet resistance. Describe a method for its measurement.
- (f) Explain molecular beam epitaxy in detail. What are its advantages over VPE?
- (g) What are the effects of nesting tolerance on MOSFET layout? Discuss and describe with the help of suitable diagrams.
- (h) Discuss and describe the various process design considerations of VLSI devices.

Section-C

Attempt any two questions.

$(2 \times 15 = 30)$

Q3. (a) What do you mean by Sputtering? Explain Sputtering Yield. Draw the schematic diagram of signal parallel-plate sputtering system and its working.

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- (b) Explain why sputtering is needed for the deposition of refractory materials like tantalum.
- Q4. (a) Discuss diffusion. Find diffusion constants for :
 - (i) Interstitial diffusion
 - (ii) Substitutional diffusion
 - (b) Give reasons and explain why NPN transistors are preferred over PNP counterparts
- Q5. Write short notes on following :
- (a) MOS IC fabrication technique
 - (b) Czochralski Process
 - (c) CVD process

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