Printed Pages – 3 EC – 605

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

PAPER ID : 3042 Roll No. | | | | | | | | | | |

B.Tech.

SIXTH SEMESTER EXAMINATION, 2005-2006

VLSI - TECHNOLOGY

Time : 2 Hours *Total Marks : 50*

Note : *(i) Attempt **ALL** questions.*

(ii) In case of numerical problems assume data whearever not provided.

(iii) Be precise in your answer.

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1. Attempt ***any four*** parts of the following : **(3.5x4=14)**

(a) Describe and discuss various features of ICs with respect to discrete integrated circuits.

(b) Explain the wafer processing technique used in IC technology.

(c) What are the various steps involved in the manufacturing of a monolithic IC.

(d) All modern silicon MOSFET's are fabricated on <100> oriented Si substrate. Why ?

(e) Why oxidation is done ? Explain the chemistry of oxidation and kinetics of oxide growth.

(f) Find the final oxide thickness after an additional oxidation in dry oxygen for 2 hours at 1200°C of a region coverd initially by 200 nano-metre of SiO_2. The linear and parabolic rate constants for dry oxidation of silicon are 1.125 $\mu m/h$ and 0.045 $\mu m^2/h$ respectively.

2. Attempt *any four* parts of the following : **(3.5x4=14)**

(a) What are the process variables which affect the diffusion process ? Explain.

(b) What is epitaxial growth ? What are the advantages of epitaxy process over diffusion and Czokralski process ?

(c) Define sheet resistance. Describe a method for its measurement.

(d) What are the advantages and disadvantages of ion-implantation over diffusion process ? Explain.

(e) Explain briefly the photolithography process. What is photoresist ?

(f) What is wet chemical etching ? What are the factors affecting etch rate ?

3. Attempt *any two* parts of the following : **(5.5x2=11)**

(a) Define thin film. Describe the vacuum evaporation technique for deposition of thin films used in integrated circuits.

(b) Describe qualitatively a complete epitaxial diffused fabrication process for n-p-n transistor for monolithic IC indicating all steps.

(c) Why is the n-p-n transistors preferred for monolithic integrated circuit fabrication over p-n-p counter part.

4. Attempt *any two* parts of the following : **(5.5x2=11)**

(a) Why depletion MOSFET is so called ? Explain the operation and characteristics of n-channel depletion type MOSFET with suitable sketches.

(b) Explain with a neat diagram the fabrication of a nMOS using self aligned poly-silicon gate technology.

(c) Define threshold voltage for a MOSFET. Describe the various technologies used to lower the magnitude of threshold voltage.

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