Total No. of Questions : 8] *[Total No. of Printed Pages : 2*

Roll No .....

MEVD-201

M.E./M.Tech. II Semester

Examination, November 2019

VLSI Technology

Time : Three Hours

Maximum Marks : 70

Note: i) Attempt any five questions.
ii) All questions carry equal marks.
iii) Assume suitable data, if necessary.

1. a) Explain the process of obtaining Electronic Grade Silicon from silicon dioxide. Write all equations involve in the process. Also, mention the different impurities present at each stage. 7
   b) Explain in brief the wafer production using Czochralski process. Mention all the steps involved in wafer production from EGS to polished wafers. 7

2. a) What is the class of cleanroom? What are the different equipments used and precautions followed to maintain the quality of clean room? What is the importance of HEPA filter? 7
   b) Explain the growth mechanism of oxide layer on silicon substrate using Deal Grove Model. Compare dry and wet oxidation. 7

3. a) What is Photolithography? Explain the different techniques of Photolithography. 7
   b) Explain the basic chemistry for positive and negative photoresist? How to differentiate dark field and light field mask? 7

4. a) Write short note on UV lithography X-ray Lithography and Electron Beam Lithography. Write the merits and applications of these lithography techniques. 7
   b) What is diffusion? What are different diffusion techniques? Compare the advantages and disadvantages of different diffusion techniques. 7

5. a) What are thin films? Explain sputtering techniques of thin film deposition. 7
   b) What is the importance of drive-in oxidation? Explain using suitable graph. Calculate the diffusion length (L) when a silicon substrate is doped with phosphorous atoms. Given $D = 10\ cm^2/s$ and $\tau = 1\ \mu s$. 7

6. a) Show the formation of (n^+ doped) source and drain region for a MOSFET using step by step diagram, starting from intrinsic silicon substrate. Indicate different layers and the number of masks used in the process. 7
   b) Explain the concept of Ion-Implantation. Compare the advantages of Ion-Implantation technique with respect to the Diffusion technique. What is the cause of implant damage and how to minimize it? 7

7. a) What is CVD? What is the different process steps involved in CVD? Explain the deposition of silicon nitride using CVD. 7
   b) What is Metallization? What are different techniques used for metallization? Indicate the properties required for a metal to be used for interconnects in integrated circuits. 7

8. Write short notes on any four: 14
   i) LPCVD ii) PECVD
   iii) VPE iv) MBE
   v) MOCVD vi) SOI

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