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10/5/2023

Name:

Roll No.:

National Institute of Technology, Hamirpur (HP)

Name of Examination: B. Tech.

(May-2023)

207

Branch : ECE
Course Name : VLSI Technology

Semester : 4th
Course Code : EC-224

Time: 3 Hours

Maximum Marks: 50

Note: 1) Attempt all the questions.

2) Assume suitable data if required

- Q (1): a) What are the requirements of silicon wafer for electronics Industry and explain atleast two methods by which such silicon can be produced. List their advantage and disadvantages (5)
- b) Which method is used for fabricating the gate oxide of MOS Device & why? Explain the method in detail. (5)
- Q (2): a) Determine the diffusivity of the phosphorous diffusion carried out for 1 hour into an p-type si single crystal wafer with a doping concentration of 10^{15} atoms/cm³. The diffusion profile follows Gaussian function. Surface concentration is 1×10^{18} atoms /cm³ and junction depth = $1 \mu\text{m}$. Suggest an experimental set up to carry out the above process. Explain the complementary error function diffusion and state boundary conditions. (5)
- b) Why is Ion-implantation preferred over diffusion for impurity doing? Explain briefly ion-implantation technique. (5)
- Q (3): a) Describe in detail the Sputter ion plasma technique for etching the dielectric layer. Discuss its various merits and demerits over other etching techniques. (5)
- b) Draw a schematic of a planner reactor used for Reactive Ion Etching and explains the process in detail. Give your observation if CF_4/H_2 is used in RIE in place of CF_4/O_2 . (5)
- Q (4): a) 741 op-amps have been fabricated using a $2 \mu\text{m}$ technology on a silicon wafer. Describe the various processes involved in the packaging of above op-amp using 8-pin plastic cases. (5)
- b) Why is it economical to fabricate diodes from transistors in IC technology? If it is true, how can diodes be fabricated from transistor? (5)
- OR
- Describe the fabrication processes for fabricating PNP BJT
- Q (5): a) Describe the fabrication of monolithic resistors and capacitor using bipolar technology. (5)
- b) How components are electrically isolated in Monolithic IC's ? (5)

Best of Luck