8E8021

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B.Tech. VIII Semester (Main) Examination, April/May 2016

Electronics And Communication Engg.

8EC1A - IC Technology

Time : 3 Hours **Maximum Marks : 80**

Min. Passing Marks : 24

Instructions to Candidates:

*Attempt any **five** questions, selecting one question from **each unit**. All questions carry equal marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.)*

Units of quantities used/calculated must be stated clearly.

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Unit - I

1. a) Explain the various defects in crystal with appropriate equation and diagram **(6)**

   b) How EGS is obtained from MGS. Also draw the block diagram for the production of EGS, and also write its chemical reaction. **(6)**

   c) Find out the concentration of oxygen in crystal at a fraction solidified of 0.4 the oxygen concentration at the top of crystal i.e at X=0.05, C_s=1.3x10^{18} atom/cm^3 segregation coefficient for oxygen to be 0.25 **(4)**

OR

1. a) Draw the block diagram of float zone growth technique and also show the four point probe technique for resistance measurment **(6)**

   b) What are the various steps for wafer preparation. Explain each term in detail **(6)**

   c) A boron doped crystal is measured at it's seed end with a four-point probe of spacing 1mm, resistance is 10Ω. What is the seed and doping and the expected reading at 0.95 fraction solified **(4)**

Unit - II

2\. a) Derive fick's law with its proper analytical solution. Also write the boundary conditions for both cases. **(8)**

b) An n+ diffusion is performed into a p-type silicon having a uniform dopant concentration of 5×10^{23} atom/m^3. If the dopant concentration in the gas above the wafer surface is maintained constant 5×10^{26} atom/m^3 and process time is 30min. Calculate the depth of n-type diffusion. The diffusion coefficient is 5×10^{-17} m^2/sec and erfc(2.3)=10^{-3} **(8)**

OR

2\. a) Explain Deal-Groove model of oxidation with proper equation **(10)**

b) Discuss the various diffusion mechanism by which the impurities in silicon crystal **(6)**

Unit - III

3\. a) What are various types of CVD reactors **(4)**

b) What is autodoping and how can this be minimized **(5)**

c) Explain chemical equilibrium and the law of Mass action **(7)**

OR

3\. a) Assume that the gas AB is introduced into a CVD reactor and that the only chemical reaction that occurs in the chamber is $A+B \rightleftharpoons A+B$. If the process is run at 1 atom (760 to rr) and a temp of 1000K and reaches chemical equilibrium. Calculate the partial pressure of each species? The equilibrium constant for this reaction is given by $K(T)=1.8\times10^9\, e^{-2ev/KT}$ **(7)**

b) Discuss various CVD techniques for deposition of SiO_2. Also state the parameters on which SiO_2 deposition depends **(9)**

Unit - IV

4\. a) Draw the flow chart for mask generation process. Explain each term with proper explanation **(5)**

b) Distinguish between wet etching and dry etching. What is the role of a buffer in the contact of wet etching **(7)**

c) Explain the working of positive photo resist and negative photo resist .Why positive photo resist gives high resolution **(4)**

OR

4\. a) Given an account of reactive ion etching clearly stating the problems associated with it **(10)**

b) Explain the projection printing with suitable diagram **(6)**

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Unit - V

5. a) Write the fabrication process sequence for

   i) n-well CMOS process

   ii) Twin tub CMOS process **(10)**

   b) What do you understand by bipolar IC technology? Give an comparison between bipolar and CMOS technology **(6)**

OR

5. a) Write short note on any **two**

   i) LOCOS method

   ii) SOI techniques

   iii) Problem associated with metallization **(5×2=10)**

   b) Explain the working difference between CMOS and bipolar IC technology **(6)**

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