

Dec.-22-0271

EC-605 (Microelectronics Technology)

B.Tech. 6th (CBCS)

Time : 3 Hours

Max. Marks : 60

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : Attempt five questions in all. Candidates need to attempt one question each from Units I, II, III & IV. Unit V is compulsory.

UNIT - I

1. Describe the production of electronic-grade Silicon from the hydrogen reduction of trichlorosilane with the suitable schematic diagram. (10)
2. Describe the process of preparation for silicon crystal growth by the Czochralski (CZ) technique. (10)

UNIT - II

3. What is hetro-epitaxial layer? Where are these layers used? Compare the quality of homo and hetro epitaxial layer. (10)
4. Define a set of conditions to minimize the chance of inverting the surface of an n-type substrate (containing a boron diffusion) when oxidizing the wafer. Also list possible ways of growing an oxide on a substrate without forming oxidation-induced stacking faults. (10)

UNIT - III

5. Develop the range theory for ion implantation. Define the projected range R_p and skewness γ parameter. Also draw the concentration profile obtained at two different energy level in ion implantation process. (10)

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6. Compare calculations of the range profiles for implantation of 100keV boron through 1500 Å of the titanium silicide into silicon using the methods of R_p scaling and dose matching. Neglect skewness and assume a dose of 10^{15} cm^{-2} . (10)

UNIT - IV

7. (a) What are the possible metallization choices for integrated circuits?
(b) What are the metallization problems? Also suggest the possible solutions of these problems. (2×5=10)
8. (a) What is purpose of multilevel metallization scheme? Describe the multilevel metallization structure using a schematic drawing.
(b) Write down the applications of metallization. (2×5=10)

UNIT - V

9. (i) What are the point defects?
(i) Write name of automated approach to the measurement of epitaxial thickness.
(iii) Define the oxidation rate.
(iv) What is the use of projection printing?
(v) What is sputtering?
(vi) Write down the name of most widely used materials for film deposition.
(vii) Write down the most used methods for diffusion.
(viii) Define the term ion stopping.
(ix) What are the causes of electromigration?
(x) What are the advantages of SRAM over the DRAM? (10×2=20)