



M.Tech. Degree Examination, May/June 2010
VLSI Technology

Time: 3 hrs.

Max. Marks:100

Note: Answer any FIVE full questions.

- 1 a. Discuss briefly the process exhaust system, recirculation air system and chilled water system as applicable to clean room. (12 Marks)
b. Explain some of the clean room maintenance practices that are followed routinely to keep clean the working personnel, wafer handling equipments and walls in a clean room. (08 Marks)
- 2 a. What are the possible sources and effects of organic contaminations? List them. How do you remove the organic contaminations? Explain. (05 Marks)
b. What do you mean by native oxide contaminations? How are they removed? Explain. (05 Marks)
c. With the chemical equations, describe the wet cleaning technology and dry cleaning technology. (10 Marks)
- 3 a. Explain the chemical reactions of growth chemistry involved in conventional silicon epitaxial growth. What is the role of growth temperature in the epitaxial process? Describe. (10 Marks)
b. With neat diagrams, describe the use of horizontal reactor and vertical reactor to get the silicon epilayer. (10 Marks)
- 4 a. How is the rapid thermal oxidation (RTO) technology used to grow thin and high quality oxide layer? Describe with equations of basic photochemistry. (10 Marks)
b. Discuss different aspects of rapid thermal annealing (RTA) for P – n junction formation and defect annealing. (10 Marks)
- 5 a. Explain the basic steps that occur in sequence in any chemical vapour deposition (CVD) reaction. (10 Marks)
b. Draw the schematic of molecular beam epitaxy growth chamber and explain briefly the process. (10 Marks)
- 6 a. Draw the schematic of ultra high vacuum CVD system and describe its application to the growth of polysilicon and epi – silicon films. (10 Marks)
b. Sketch the schematic of parallel plate type and single wafer type of plasma enhanced CVD reactors and explain them. (10 Marks)
- 7 a. With neat diagrams of flow of data in electron beam exposure systems, explain different concepts of electron lithography. (10 Marks)
b. Draw the necessary sketches and explain the fundamentals of a sputtering process which is used in physical vapour deposition of metal films. (10 Marks)
- 8 a. Describe the fabrication process sequence of a typical CMOS process, giving the necessary diagrams. (10 Marks)
b. Draw the sketches of cross sections of three junction isolated processes of standard buried collector transistor, collector – diffused isolation transistor and triple – diffused transistor and explain them. (10 Marks)