Roll No. | | | | | | | | | | | | | Total No. of Pages : 01

Total No. of Questions : 08

M.Tech. (Microelectronics) (Sem.–1)

MICRO & NANO SCIENCES & TECHNOLOGY

Subject Code : ME-801

M.Code : 38401

Time : 3 Hrs. Max. Marks : 100

INSTRUCTIONS TO CANDIDATES :

1. **Attempt any FIVE questions out of EIGHT question.**
2. **Each question carries TWENTY marks.**

1. a) Classify and explain the defects in real crystal of silicon (with diagram).

   b) As an impurity, explain the three effects of oxygen in silicon.

2. a) Which are the four silicon sources used for growing epitaxial silicon? Write down and explain the reactions for the same.

   b) Explain the growth mechanism and kinetics for Silicon Oxidation.

3. With the help of schematic diagram, explain the Molecular Beam Epitaxial growth chamber and growth process. What are the requirements for good quality epitaxial films?

4. a) Explain the process of projection printing used in optical lithography. How is it differs from proximity printing?

   b) What are the effects of excitation frequency, flow rate and pressure on the etch rate in plasma etching process? Explain.

5. a) Write Fick's 1-D diffusion equation and explain its significance. Also explain constant source and limited source diffusion.

   b) What do you understand by annealing? Discuss furnace annealing process in brief.

6. a) Highlight various advantages of ion implantation in comparison to conventional diffusion process. What are the disadvantages of ion implanted films?

   b) Enlist various application of polycrystalline silicon. Explain the process used for deposition of polysilicon films.

7. a) With the help of labeled diagrams, explain the process steps involved in N-MOS IC fabrication.

   b) Enlist various package design considerations in ICs. Explain any two in detail.

8. a) Explain the various types of interaction mechanisms that various analytical beams have with materials.

   b) Write the short note on following :

      (i) Fermi-Dirac Function

      (ii) Crystal structures

NOTE : Disclosure of identity by writing mobile number or making passing request on any page of Answer sheet will lead to UMC case against the Student.