Roll No. | | | | | | | | | | | | | Total No. of Pages : 02

Total No. of Questions : 08

M.Tech.(VLSI D) EL-III (2016 & Onwards) (Sem.–3)

PROCESS AND DEVICE CHARACTERIZATION & MEASUREMENTS

Subject Code : MTVL-307

Paper ID : [74816]

Time : 3 Hrs. Max. Marks : 100

INSTRUCTIONS TO CANDIDATES :

1. Attempt any FIVE questions out of EIGHT questions.
2. Each question carry equal marks.

Q1 a) Describe spreading resistance profiling (SPR) technique in detail.

b) What do you mean by sheet resistance? Derive the expression for sheet resistance of uniformly doped sample using four probe method.

Q2 a) For a p-type Si MOS capacitor $C_{inv}/C_{Ox} = 0.22$ and $t_{ox} = 1.5$ nm.

i) Determine the doping density for this device using $k_{ox} = 3.9$, $k_s = 11.7$, $n_i = 10^{10}$ cm^{-3}, $A = 5 \times 10^{-14}$ cm^2 and T = 27° C

ii) Determine C_{inv}/C_{ox} when $N_A = 5 \times 10^{15}$ cm^{-3}.

b) What do you understand by Debye length? Discuss the consequences of Debye length.

Q3 a) Describe interlaced trapped charge DLTS briefly. How data interpretation is different in interlaced trapped charge DLTS from bulk deep level DLTS.

b) What measurement precaution should be taken care while measuring various electrical and optical characteristics?

Q4 a) How can iron in Silicon be detected with lifetime/diffusion length measurement?

b) Describe the reverse recovery method to determine I-V waveform for p-n junction diode.

Q5 a) Describe spectroscopic ellipsometry. Briefly explain the applications of ellipsometry.

b) With the help of schematic diagram, explain the working of Scanning Electron Microscope.

Q6 Discuss two instrumentation approaches used in secondary Ion Mass spectroscopy.

Q7 a) Define following :

i) Resolution

ii) Magnification

iii) Contrast

b) Explain with appropriate schematic diagram, how two dimensional pictures can be generated using scanning confocal microscope.

Q8 Write a short note on :

i) Metal Semiconductor contacts in Schottky Diode.

ii) Recombination life time and Generation lifetime.