

GUJARAT TECHNOLOGICAL UNIVERSITY**M.E Sem-I Regular Examination January / February 2011****Subject code: 713006N****Subject Name: Nano Devices' Fabrication Technology****Date: 04 /02 /2011****Time: 02.30 pm – 05.00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) Explain construction & working of Czochralski Crystallizer with neat diagram. **07**
 (b) How the pulling rate of Single Crystal ingot is decided? What happens when growth rate and pulling rate are not matching? **07**

- Q.2** (a) Discuss Cutting and Polishing of Silicon Wafers. What are flats? Discuss requirement of flats for P⁺ type and n⁺ type junctions. **07**
 (b) Why Silicon dioxide layer is deposited over Silicon during Nano device fabrication? Discuss deposition of Silicon dioxide over Silicon by oxidation process. **07**

OR

- (b) When oxide is called thin oxide. Discuss growth mechanism of thin oxide and its properties **07**

- Q.3** (a) With neat diagram discuss construction and working of LPCVD used for vapor deposition. Discuss the mechanism of depositing Silicon from Silane over Silicon substrate **07**
 (b) Differentiate Dry and Wet etching. Briefly discuss about chemicals used for Wet Etching. **07**

OR

- Q.3** (a) With reference to diffusivities of B,P,As and Sb, Discuss the electric field effect, Band gap narrowing effect and high concentration effect on diffusivity. **07**
 (b) What are the measurement techniques for measuring diffusivity? **07**

- Q.4** (a) What is Metallization? What are the desired properties of the Metallization for IC? **07**
 (b) Discuss the string model for Etching and deposition. **07**

OR

- Q.4** (a) Discuss the processing steps in NMOS. **07**
 (b) Discuss Optical Projection Lithography. **07**

- Q.5** (a) Discuss mask generation process for electron lithography. **07**
 (b) Define: **07**

- (i) Numerical Aperture(NA)
- (ii) Diffraction
- (iii) Depth of focus (DOF)
- (iv) Modulation transfer function (MTF)
- (v) Off axis illumination (OAI)
- (vi) Optical Proximity Correction (OPC)

OR

- Q.5** (a) Write a short note on Ion lithography. **07**
 (b) Discuss contact and proximity printing. **07**
