

**B.TECH.**

**THEORY EXAMINATION (SEM-VIII) 2016-17**

**INTEGRATED CIRCUIT TECHNOLOGY**

**Time : 3 Hours**

**Max. Marks : 100**

**Note : Be precise in your answer. In case of numerical problem assume data wherever not provided.**

**SECTION – A**

**1. Explain the following:**

**10 x 2 = 20**

- (a) What is diffusion?
- (b) What is meant by annealing?
- (c) What is Negative Photoresist?
- (d) What is Auto Doping?
- (e) What is Etching?
- (f) List Oxide Properties?
- (g) Explain importance of Silicon Dioxide in Fabrication?
- (h) Classify IC on the basis of their complexity?
- (i) What is Packaging?
- (j) List the advantage of Ion Implantation?

**SECTION – B**

**2. Attempt any five parts of the following questions:**

**5 x 10 = 50**

- (a) State and explain Fick's first law of diffusion. Derive Fick's second law from the first
- (b) Define thin films. Describe a physical vapour deposition technique for film deposition what should be the required characteristics of the deposited film and how can it be achieved?
- (c) Describe briefly the advantages and disadvantages of Atmospheric Pressure Chemical Vapour Deposition(APCVD). Also describe the system.
- (d) What is wet chemical etching? Name the common etchant used in integrated circuit fabrication with their composition for Si, SiO<sub>2</sub> and Si<sub>3</sub>N<sub>4</sub> etching
- (e) What are the advantages of polysilicon gate technology over metal gate? How is it fabricated?
- (f) What is sheet resistance? Describe four-point probe method for the measurement of sheet resistance.
- (g) A silicon wafer is covered with a 200 nm thick layer of silicon dioxide. What is the added time required to grow an additional 100 nm of silicon dioxide in dry oxygen at 1200 °C? Given that the linear and parabolic rate constants for dry oxidation of silicon are 1.125 micrometer per hour and 0.045 micrometer square per hour respectively at 1200 °C.
- (h) (i) Why is oxidation done? Explain the kinetics of oxide growth.  
(ii) All modern Si MOSFETS are fabricated on (100) oriented Si substrate. Explain why?

**SECTION – C**

**Attempt any two parts of the following questions:**

**2 x 15 = 30**

- 3** What is Ion-implantation? Why ion-implantation is preferred over diffusion for impurity doping? Explain briefly ion-implantation technique with a labeled sketch
- 4** What are the applications of metallization? What are the various choices for it? Why silicides are used? Discuss the advantages associated with silicide technology. List the metals used in silicidation.
- 5** Explain, why sputtering is needed for the deposition of refractory materials like tantalum. With neat diagram explain the D.C. sputtering technique.