Roll No.
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BT-5 / D–15
MICROELECTRONICS
Paper–ECE-309-E

Time allowed : 3 hours] *[Maximum marks : 100*

*Note : Attempt **five** questions by selecting at least **one** question from each unit.*

Unit–I

1. (a) Discuss how in CZ technique, the diameter of Silicon Crystal depend upon pulling rate. 7

   (b) Give various applications of Silicon dioxide films. How it is difficult to grow its thin films in nanometer range ? 6

   (c) Give the principle of operation of MBE ? Describe its working. 7

2. (a) How the Silicon wafer is prepared using CZ and FZ technique differ in terms of various physical properties ? 10

   (b) Describe various Silicon shaping techniques. How wafers are prepared ? 10

Unit–II

3. (a) Why photolithography is most popular in microelectronic processing ? Describe the steps involved in it. 10

   (b) What do you mean by anisotropic etching ? Discuss role of KOH in achieving this. 10

4. (a) What do you understand by E-Beam lithography ? Why this technique is used for mask making ? 10

   (b) What do you understand by Reactive plasma etching techniques ? How fluorine Chemistry is exploited in etching techniques ? Give its advantages. 10

Unit–III

5. (a) What do you understand by diffusion mechanism in solids ? Give Fick's law of diffusion and its solution for constant-total-dopant diffusion ? 10

(b) Give the principle of operation of Ion-Implantation technique used for doping. Why annealing is required after ion-implantation ? 10

6. (a) Explain diffusion of impurities in SiO_2. What is its significance? 10

(b) Give a schematic diagram of an ion-implanter. How the range of ions is estimated ? 10

Unit–IV

7. (a) Give important processing steps and prepare necessary flow chart for the Fabrication of NMOS transistor. 12

(b) Discuss how Bipolar IC fabrication is carried out ? Give process sequence with different mask requirements. 8

8. (a) How package selection and bonding pad layout are decided by chip designers ? 10

(b) Write short notes on the following :

(i) MEMS packaging

(ii) Package design considerations. 10