Duration: 3hrs **Marks:80**

Note:

1) **Question No 1 is Compulsory.**
2) **Answer any three from the remaining questions.**
3) **Assume suitable data wherever required**

Q1 Solve any four of the following (20)

a. Discuss two key trends in semiconductor technology and their implications for device performance and manufacturing processes.

b. Explain the difference between Dry etching and Wet etching

c. What do you mean by photo-resist? Explain various types of photo-resists

d. What are the basic reactions in the formation of SiO_2 in dry oxidation and wet oxidation? Explain where these methods are used during MOSFET fabrication process

e. Differentiate between Schottky contacts and Ohmic Contacts.

Q2. a. Explain the steps of lithography with suitable diagrams. Also, classify Lithography techniques (10)

b. List out common unit processes in IC fabrication. Explain fabrication process steps along with vertical cross-sectional views for the CMOS inverter using the N-well Process. (10)

Q3. a. What is the Shallow Trench Isolation (STI) technique? Why it is required in the CMOS process? (10)

b. Explain the importance of design rules in ensuring proper functionality and manufacturability of CMOS devices. Draw a Layout for two input CMOS NOR gates using a lambda-based design rules. Use colour codes appropriately (10)

Q4. a. Describe the principles of operation in evaporation and sputtering processes highlighting the key differences in process and equipment. (10)

b. With a neat diagram, Explain the Bridgman technique for the growth of GaAs (10)

Q5. a. Why are the Two-dimensional materials (2D) important? Give an example of 2D materials. Compare CNTFET with MOSFET. (10)

b. Describe two common methods used for fabricating SOI wafers and discuss the key features and advantages of SOI technology compared to traditional bulk silicon substrates. (10)

Q6. Write short notes on any four of the following. (20)

a. Pre-deposition and drive in steps in the Diffusion process

b. Buried and Butting Contacts

c. Fabrication of MESFET

d. CMOS Latch Up

e. Wafer cleaning and Gettering
