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**B.TECH**  
**(VII) THEORY EXAMINATION 2020-21**  
**VLSI DESIGN**

Time: 3 Hours

Total Marks: 100

Note: Attempt all Sections. If require any missing data; then choose suitably.

## SECTION A

1. Attempt all questions in brief. 2 x 10 = 20

a.	Explain the term controllability and observability.
b.	Define delay time and discuss delay models.
c.	Why we need low power VLSI circuits in today's scenario?
d.	What is channel length modulation?
e.	Give the different scaling models and scaling factors?
f.	List out different IC technologies including number of gates.
g.	Implement 2:1 MUX using CMOS transmission gate.
h.	Define LSI, MSI, VLSI, and ULSI on number of transistor basis.
i.	State the disadvantages of dynamic CMOS logic?
j.	Distinguish between SRAM and DRAM.

## SECTION B

2. Attempt any three of the following: 10x3=30

a.	Realize the following function $F=A \text{ XOR } B$ using CMOS logic?
b.	Explain the fault models and stuck at faults.
c.	Draw the stick diagram and mask layout for CMOS two input NOR gate and stick diagram of two input NAND gates.
d.	Draw the Y-chart and explain the concept of Design Hierarchy with the help of example.
e.	Determine the scaling factors of the following: (i) Current density                      (iii) Channel resistance (ii) Gate capacitance                      (iv) Gate delay

## SECTION C

3. Attempt any one part of the following: 10x1=10

a.	Explain the various strategies of VLSI system design.
b.	Why transistor scaling is of great importance in VLSI. Write down comparison between Constant field scaling and Constant voltage scaling

4. Attempt any one part of the following: 10x1=10

a.	What are the steps involved in the NMOS fabrication? Explain with neat sketches.
b.	Explain the concept of RC Delay model.

5. Attempt any one part of the following: 10x1=10

a.	What are the sources of power dissipation in CMOS circuits? Explain Dynamic and static power consumption.
b.	Narrate in detail about VLSI low power architectures with suitable example.

6. Attempt any one part of the following: 10x1=10

a.	What are the different types of RAM? Explain DRAM memory cell.
b.	Draw the basic block diagram of RAM? Differentiate between SRAM and DRAM.

7. Attempt any one part of the following: 10x1=10

a.	Explain the fault models and stuck at faults.
b.	Explain Ad Hoc Testable Design Techniques with suitable example.