U.S.N.										

B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

February / March 2023 Semester End Main Examinations

Programme: B.E. **Semester: VII**
Branch: ES – Cluster Elective **Duration: 3 hrs.**
Course Code: 19EC7CE2LV **Max Marks: 100**
Course: Low Power VLSI **Date: 28.02.2023**

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

UNIT - I

1 a) Explain the latch-up problem of CMOS devices. How can it be overcome? **10**

b) Discuss the switching characteristics of a CMOS inverter and obtain an estimate of the inverter delay. **10**

UNIT - II

2 a) With the help of a neat circuit diagram, briefly explain the working of a domino CMOS logic circuit. **08**

b) List the Various mechanisms which affect the sub threshold leakage current and explain any two in detail. **08**

c) A 32 bit off-chip bus operating at 4.8 Volt and 64 MHz clock rate is driving a capacitance of 25 pF/bit. Each bit is estimated to have toggling probability of 0.25 at each clock cycle. What is the power dissipation operating the bus? **04**

UNIT - III

3 a) Distinguish between constant-field and constant-voltage feature size scaling **08**

b) Explain Multilevel Voltage Scaling and discuss the challenges in its implementation. **12**

UNIT - IV

4 a) What are the different clock gating cells and explain them. **06**

b) What are Glitches? What is the effect of Glitches on power consumption? How are they minimized? **06**

c) Explain the concept of bus encoding, and explain the different types of encoding with a neat diagram. **08**

OR

5	a)	Draw the circuit diagram of MTCMOS and VTCMOS inverter circuit. Analyze their leakage power optimizing principle.	**10**
	b)	Illustrate the transistor stack effect. How can it be used to reduce leakage power dissipation in standby mode?	**10**

UNIT - V

6	a)	Discuss the basic principle of Adiabatic Amplification with neat diagram	**10**
	b)	Define the term energy density in battery, discuss on any 2 popular rechargeable battery technologies	**10**

OR

7	a)	Prove that the charging of a capacitor C in n steps to a voltage V_{DD} instead of a conventional single-step charging reduces the power dissipation by a factor of n. Discuss the disadvantages of this stepwise charging circuit.	**10**
	b)	Indicate the significance of a battery-aware task scheduling technique in battery driven systems.	**10**

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