09/06/2025 TE EXTC SEM-V C-SCHEME DVLSI QP CODE: 10087593

Duration: 3hrs   **[Max Marks: 80]**

N.B. : (1) Question No 1 is Compulsory.
     (2) Attempt any three questions out of the remaining five.
     (3) All questions carry equal marks.
     (4) Assume suitable data, if required and state it clearly.

1   Attempt any FOUR   [20]

  a   Define the term Clock skew and its various types.

  b   For a NMOS transistor if (W/L)=10 $\mu_n C_{OX}$=100μA/V^2 and if Overdrive voltage is 2V then calculate the Value of drain current I_D and Trans conductance gm.

  c   Draw and Explain the working of NAND based Flash memory.

  d   Realize 4:1 mux using TG logic.

  e   Draw the mask layout diagram for PMOS & NMOS transistor using lambda based design rules.

2 a   Draw & Explain working of 6T SRAM with its read and write operation.   [10]

  b   Draw and explain the process of fabricating NMOS transistor.   [10]

3 a   Realize Clocked S-R flip flop using Static CMOS logic and explain the working.   [10]

  b   Draw and explain CMOS inverter with transfer characteristic. Derive the expression for its Threshold voltage.   [10]

4 a   Draw and explain 4 bit carry select adder along with its advantages and disadvantages.   [10]

  b   Design a 'soda vending machine' using the RTL design process.   [10]

5 a   Realize the expression $Y = \overline{AB + CD}$ using the following logic style.   [10]

       1. CMOS logic

       2. Pseudo NMOS

       3. Dynamic Logic

       4. Domino Logic

X525Y733EC5X525Y733EC5X525Y733EC5X525Y733EC5

b Realize the 2 input NAND and NOR gate using CMOS logic. Find equivalent [10] CMOS inverter for simultaneously switching of all input. Assume $(\frac{W}{L})p = 20,$ $(\frac{W}{L})n = 15$

6 a With respect to suitable figure explain the various parasitic capacitors associated [10] with the MOSFET.

b Design 4 *4 bit NOR based memory array and its row decoder to store the [10] following data in respective memory locations.

Memory address	Data
1000	0011
0100	0101
0010	1111
0001	1010

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X525Y733EC5X525Y733EC5X525Y733EC5X525Y733EC5