

Fifth Semester B.E. Degree Examination, December 2010
Fundamentals of CMOS VLSI

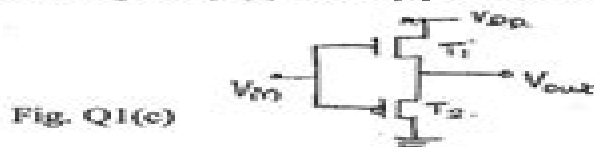
Time: 3 hrs.

Max. Marks:100

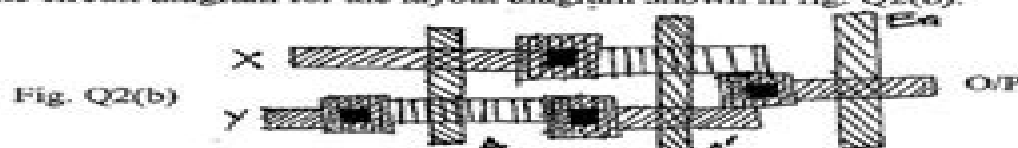
Note: 1. Answer any FIVE full questions, selecting atleast TWO questions from each of Part – A and Part – B.
 2. Missing data may be assumed suitably.

PART – A

1. a. What do you mean by static load inverters? Derive the output voltage for the pseudo inverter by discussing its DC transfer characteristics. (08 Marks)
- b. In a $0.5\mu\text{m}$ process $\mu_{n0} = 44.69 \times 10^{-3} \text{ m}^2/\text{V}$, $t_{ox} = 14.1\text{nm}$ and the $(W/L) = \frac{30}{5}$. The NMos has $V_t = 0.71\text{V}$ and $V_{DD} = 1.5\text{V}$. At what levels of V_{in} and i_d , will the MOSFET reach pinch off mode? Hint : ($\epsilon_{ox} = 3.9\epsilon_0$). (06 Marks)
- c. What is the functionality of the circuit shown in fig. Q1(c). Is it correct method to connect the circuit as shown in figure Q1(c)? Justify your answer. (06 Marks)



2. a. Draw the Cmos circuit for half adder. (Hint : Sum = $A \oplus B$, carry = AB , Inverted i/p's are allowed). (08 Marks)
- b. Draw the circuit diagram for the layout diagram shown in fig. Q2(b). (08 Marks)



- c. What are the basic layers of MOS circuit? (04 Marks)
3. a. Explain the working principle of dynamic CMOS logic and clocked CMOS logic of "Nand" gate. (12 Marks)
- b. Implement the pass transistor logic circuit for the expression $Y = A + BC$. Show the design steps clearly. (08 Marks)
4. a. Discuss the limitations of scaling. (10 Marks)
- b. Derive the expression for total delay for N stage of NMOS and CMOS inverters by assuming the width factor $f = e$. (10 Marks)

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