10EC56

Fifth Semester B.E. Degree Examination, Aug./Sept. 2020
Fundamentals of CMOS VLSI

Time: 3 hrs.   Max. Marks:100

Note: *Answer FIVE full questions, selecting at least TWO questions from each part.*

PART – A

1 a. With neat diagram, explain the step by step procedure of fabrication steps of CMOS P-well process and write the mark sequence. **(10 Marks)**
   b. Derive the necessary expressions for V_{out} in all the regions of CMOS inverter? Explain. **(10 Marks)**

2 a. What is body effect? Which parameters are responsible for it? **(08 Marks)**
   b. Explain the Pseudo-NMOS logic structure and their salient features with example. **(08 Marks)**
   c. Compare CMOS and bipolar technologies. **(04 Marks)**

3 a. Explain the operation of CMOS dynamic logic. Also discuss the cascading problem of dynamic CMOS logic. **(10 Marks)**
   b. Implement using CMOS logic structure and its stick diagram:
       (i) $Z = \overline{A + B + CD}$.
       (ii) $Z = \overline{A(D + E) + BC}$ **(10 Marks)**

4 a. What are the scaling factors of,
       (i)   Parastic capacitance C_X.
       (ii)   Power dissipation per unit area P_a. **(04 Marks)**
   b. Two nMOS inverters are cascaded to drive capacitive load $C_L = 16C_g$ as shown in Fig. Q4(b). Calculate pair delay V_{in} to V_{out} interms of τ. **(06 Marks)**
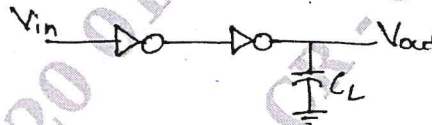

Fig. Q4 (b)

   c. Explain with circuit diagram the super buffers with inverting type and non-inverting type of nMOS. **(10 Marks)**

PART – B

5 a. Explain structured design of bus arbitration logic for n-line bus. **(10 Marks)**
   b. Discuss the architectural issues to be followed in the design of VLSI subsystems. **(10 Marks)**

6 a. Design a 4:1 multiplexer using nMOS logic and CMOS logic. **(10 Marks)**
   b. Explain the implementation of ALU functions with a standard adder. **(10 Marks)**

7 a. How to read or write and hold the bit in SRAM cell? **(10 Marks)**
   b. Discuss CMOS pseudo-static memory cell with stick diagram. **(10 Marks)**

8 a. Explain sensitized path based testing for combinational logic. **(10 Marks)**
   b. Write a note on testability and testing. **(10 Marks)**

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