Sixth Semester B.E. Degree Examination, Aug./Sept. 2020
VLSI Design

Time: 3 hrs.   Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Explain the ideal I.V characteristics of nMOS transistor. Derive the equation for I_{DS} in three region i) cut off region ii) non–saturated region iii) saturation region. **(10 Marks)**
   b. Explain the nMOS fabrication with neat diagram. **(06 Marks)**

OR

2 a. Explain the CMOS inverter transfer characteristics highlighting the regions of operations of the MOS transistor. **(06 Marks)**
   b. Describe with heat sketches the fabrication of P-well CMOS inverter. **(06 Marks)**
   c. Compare CMOS and bipolar technology. **(04 Marks)**

Module-2

3 a. Draw the circuit schematic and stick diagram of CMOS 2 input NAND gate. **(08 Marks)**
   b. Explain briefly λ-based design rules for wire and transistor (nMOS, PMOS, CMOS). **(08 Marks)**

OR

4 a. Explain with diagram rise time model and fall time model of CMOS inverter. **(06 Marks)**
   b. Explain briefly the circuit of inverting and non-inverting super buffer. **(06 Marks)**
   c. Explain delay unit τ. **(04 Marks)**

Module-3

5 a. What are the most commonly used scaling models? Provide scaling factor for :
      i) Power dissipasen per gate   ii) Current density
      iii) Channel resistance Ron   iv) Parasitic capacitance C_x. **(06 Marks)**
   b. What are the general considerations to be followed in designing a sub system? **(05 Marks)**
   c. Explain the design steps for 4-bit adder. **(05 Marks)**

OR

6 a. Design regularity. **(04 Marks)**
   b. Design 4 bit ALU to implement addition subtraction, EX-OR, EX-NOR and AND operation. **(12 Marks)**

Module-4

7 a. Discuss the architectural issue related to sub system design. **(06 Marks)**
   b. Explain briefly a parity generator with block diagram and stick diagram. **(06 Marks)**
   c. Give the comparison of SSRAM and antifuse FPGA. **(04 Marks)**

OR

8 a. Explain with schematic view of flash based FPGA. **(05 Marks)**
   b. Explain briefly switch logic implementing of a four way multiplexer. **(07 Marks)**
   c. What are the advantages of FPGA? **(04 Marks)**

Module-5

9 a. Explain the three transistor dynamic RAM – cell. **(08 Marks)**
   b. Explain briefly nMOS Pseudo static memory cell. **(08 Marks)**

OR

10 a. Explain briefly logic verification principle. **(08 Marks)**
   b. Write a short note on : i) Built In Self Test (BIST) ii) Scan Design Technology. **(08 Marks)**

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