CBCS SCHEME

USN | | | | | | | | | |

15EC63

Sixth Semester B.E. Degree Examination, Feb./Mar. 2022
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. With neat diagrams, explain the operation of nMOS enhancement mode transistor. **(06 Marks)**

b. Explain the following non-ideal effects of MOS device
   i) Channel length modulation
   ii) Body effect
   iii) Noise margin. **(10 Marks)**

OR

2 a. With neat diagrams, discuss the nMOS fabrication process steps. **(08 Marks)**

b. Explain the CMOS inverter DC characteristics with neat diagrams and equations. **(08 Marks)**

Module-2

3 a. Draw the circuit diagram and stick diagram for the expression $f = \overline{A(B+C)}$ using nMOS and CMOS design styles. **(08 Marks)**

b. With neat diagrams, explain λ-based design rules for wires, transistors and contacts in nMOS and CMOS process. **(08 Marks)**

OR

4 a. Derive an equation for rise time and fall time with respect to CMOS inverter. **(10 Marks)**

b. Estimate the total area capacitance for the structure shown in Fig.Q4(b). Consider 5μm technology with relative C values for metal = 0.075□Cg and polysilicon = 0.1□Cg.

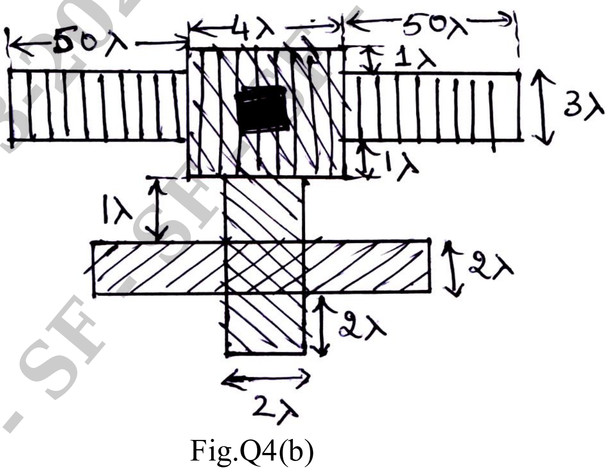

Fig.Q4(b) **(06 Marks)**

Module-3

5 a. Identify various scaling models and derive the scaling factors for any eight device parameters. **(10 Marks)**

b. Explain the operation of 4-bit barallel shifter with neat diagram. **(06 Marks)**

OR

6 a. Implement 4-bit carry look ahead adder using Multiple Output Domino Logic (MODL) with necessary equations. **(08 Marks)**

b. With neat circuit diagram and truth table, explain the operation of Manchester carry chain adder. **(08 Marks)**

Module-4

7 a. Explain the operation of (n + 1) bit parity generator with relevant circuit diagram and stick diagram. **(08 Marks)**

b. Implement 4 : 1 MUX using switch logic with relevant truth table and equations. Also write the stick diagram. **(08 Marks)**

OR

8 a. With neat diagram, explain design abstraction for FPGA (Filed Programmable Gate Array). **(08 Marks)**

b. Explain the architecture of field programmable gate array. **(08 Marks)**

Module-5

9 a. Explain the operation of 4 transistor dynamic memory and 6 transistor CMOS memory cells with sense amplifier circuit with neat circuit diagrams. **(10 Marks)**

b. Explain the operation of D-latch using nMOS and CMOS design styles. **(06 Marks)**

OR

10 a. Identify various fault models and explain each fault model with relevant diagrams and layout. **(12 Marks)**

b. Explain the operation of built in logic block observation (BILBO) used in testing. **(04 Marks)**

* * * * *