



USN

Fifth Semester B.E. Degree Examination, Jan./Feb. 2021
Fundamentals of CMOS VLSI

10EC56

Max. Marks:100

Note: Answer FIVE full questions, selecting atleast TWO questions from each part.

PART – A

- 1 a. Derive CMOS inverter DC characteristics graphically and explain. (08 Marks)
b. Explain the mask sequence of CMOS P-well inverter with neat sketches. (08 Marks)
c. Briefly discuss pass transistor and tristate inverter. (04 Marks)
- 2 a. Draw symbolic form diagram of 1 bit CMOS shift register cell. (06 Marks)
b. What is stick diagram? Draw stick and layout diagram for $y = \overline{ABC+DE}$. (08 Marks)
c. Explain design rules for wires (nMOS and CMOS). (06 Marks)
- 3 a. Draw two input NAND gate using BiCMOS and CMOS domino logic. (06 Marks)
b. Explain with neat diagram, the drawback of dynamic CMOS logic and explain how above drawback is eliminated using necessary diagram. (08 Marks)
c. Explain in detail simple CVSL. (06 Marks)
- 4 a. Explain the problem of driving large capacitive loads. (08 Marks)
b. Discuss the effect of scaling on gate capacitance maximum operating frequency, current density and power speed product. (08 Marks)
c. Define sheet resistance and standard unit of capacitance \square cg. (04 Marks)

PART – B

- 5 a. Briefly discuss n-p CMOS logic. (04 Marks)
b. Design bus arbitration logic for n-line bus. (10 Marks)
c. Discuss two-phase clock generator using D-flip flops. (06 Marks)
- 6 a. Explain basic bus architectures. (06 Marks)
b. With a neat diagram, explain the arrangement of an adder element for both arithmetic and logical functions. (08 Marks)
c. Explain carry select adder with neat structure. (06 Marks)
- 7 a. Explain JK flip-flop arrangement as static memory element. (08 Marks)
b. Explain pseudo static register cell. (08 Marks)
c. With a neat diagram, explain CMOS pseudo-static D-flip-flop. (04 Marks)
- 8 a. Draw a circuit model for inverter driving an inverter on a $\Delta\%$ transition. (04 Marks)
b. Explain the requirement by the I/O pads. (06 Marks)
c. Write note on test and testability. (10 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.