

[Total No. of Questions - 8] [Total No. of Printed Pages - 2]
(2125)

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M. Tech 3rd Semester Examination

Design of C-MOS VLSI System

EC-307

Time : 3 Hours

Max. Marks : 100

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : (i) Attempt any five questions.
(ii) All questions are of equal marks.

1. (a) Derive the drain current of MOS device in different regions of operation.
(b) Explain the following term:
 - (i) Drain induced barrier lowering.
 - (ii) Gate induced drain leakage.
 - (iii) Punch through.
 - (iv) Subthreshold current. (10+10=20)
2. (a) Draw CMOS inverter characteristics and classify the different regions of operation. Also drive the input output relation in these regions.
(b) Drive V_{IL} and V_{OH} for the resistive load inverter and minimum size CMOS inverter at 180nm technology. (10+10=20)
3. (a) Describe CMOS transmission gate logic. Find out the equivalent resistance in different regions of operation.

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- (b) Draw the CMOS circuit and stick diagram for two input EX-OR and EX-NOR gates. (10+10=20)
4. (a) Explain the circuit of positive edge triggered transmission gate flip flop.
(b) Draw and explain gate level schematic of SR latch using only two input CMOS NAND gates.
(c) Describe the circuit of CMOS Schmitt trigger circuit. (6+6+8=20)
5. (a) Elaborate various design constraints for the clock distribution network in VLSI chip. Explain the binary tree clock distribution network.
(b) Describe the Elmore interconnect delay model. Describe uniform repeater insertion method to improve the performance of interconnects. (10+10=20)
6. (a) What are the SPICE basics for circuit simulation and power analysis? What are various types of transition modeling and analysis?
(b) Describe the cascading problem in dynamic CMOS logic. Explain NORA CMOS logic in detail and compare with static CMOS logic. (10+10=20)
7. Describe the advantages of BiCMOS technology. Explain the fabrication steps for the transistor. Explain the applications of BiCMOS (20)
8. Explain the following:
 - (i) Short Circuit Power Dissipation
 - (ii) Crosstalk in Interconnects
 - (iii) Double edge triggered Flip Flop
 - (iv) RAM cell design. (4×5=20)