MANIPAL UNIVERSITY

Question Paper

MANIPAL UNIVERSITY

SCHOOL OF INFORMATION SCIENCES (SOIS)
SECOND SEMESTER MASTER OF SCIENCE - M.Sc. Tech /MASTER OF ENGINEERING - ME(VLSI DESIGN)
DEGREE EXAMINATION-APRIL / MAY 2017
Wednesday, 26, 2017
Time : 10:00 AM - 1:00 PM

Advanced VLSI Design [EDA 604]

Marks: 100 **Duration: 180 mins.**

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Answer all the questions.

1) A) Explain the effect of Temperature and Voltage on CMOS Resistor. (10)
B) Estimate the minimum and maximum resistance of an n-well resistor with a length of 100µm and a width of 10µm over a temperature range of 0 to 100°C.
[Data Given: TCR = 10,000ppm/°C; N-well sheet resistance = 2KΩ to 3KΩ / square]

2) Starting from a general 2-port network, derive a complete low frequency, small signal model for a MOSFET. (10)

3) Draw and explain the circuit of Cascode Current Mirror and show that output resistance of the n-stage cascode current mirror $\mathbf{R_{o(n)} = r_o(1+g_mR_{o(n-1)})+R_{o(n-1)}}$, where r_o is output resistance of all the MOSFETs, g_m is the transconductance of all the MOS used in the circuit. (10)

4) With a diagram, explain cascode current mirror. What are its advantages over a simple current mirror? (10)

5) Draw a neat schematic and explain the Thermal Voltage Referenced Self-Biasing circuit (10)

6) What is differential amplification? What are its advantages over single-ended amplification? (10)

7) What are the advantages of switched-capacitor circuits? With the help of a simple diagram, explain a switched-capacitor resistor circuit (10)

8) (10)

With a neat schematic diagram showing all three stages, explain the working of a CMOS nonlinear analog comparator circuit

9) Discuss the different errors that occur in a Sample-and-Hold circuit (10)

10) With relevant diagrams, explain the working of Current Steering DAC. Derive an expression for its $|INL|_{max}$ and $|DNL|_{max}$ (10)

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