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14EVE421

Fourth Semester M.Tech. Degree Examination, June /July 2016
Advances in VLSI Design

Time: 3 hrs.

Max. Marks:100

Note: Answer any FIVE full questions.

- 1
 - a. Explain CMOS inverter using transfer characteristic and describe aspect ratio with relevant expression. (10 Marks)
 - b. Using switch logic, write CMOS NAND gate and CMOS NOR gate diagram. (06 Marks)
 - c. Compare CMOS and BiCMOS technologies. (04 Marks)
- 2
 - a. Explain MESFET under bias of V_D below pinch off and bias at pinch off with its current – voltage characteristic. (10 Marks)
 - b. Derive an expression for the pinch-off voltage in MESFET with an active layer thickness of 't'. (06 Marks)
 - c. Differentiate between MESFET and MODFET. (04 Marks)
- 3
 - a. Describe the MIS system under three different biased conditions (i.e accumulation, depletion and inversion region). (12 Marks)
 - b. Calculate the threshold voltage (V_T) for a n-channel MIS device given the following $N_a = 10^{17} \text{ cm}^{-3}$, $Q_i = 10^{-8} \text{ a/cm}^2$, $d = 20 \text{ nm}$ and $Q_{ms} = -0.95 \text{ V}$. (08 Marks)
- 4
 - a. With a neat diagram, explain two dimensional potential profile for a long channel MOSFET device and short channel MOSFET device. (12 Marks)
 - b. Describe the processing challenges to further CMOS miniaturization. (08 Marks)
- 5
 - a. Explain the differences between bulk MOSFET and SOI MOSFET in the gate controlled depletion region. (10 Marks)
 - b. Discuss :
 - i) Conventional Vs tactile computation
 - ii) Molecular and biological computing. (10 Marks)
- 6
 - a. Explain RC delay line using long silicon line using suitable mathematical analysis. (10 Marks)
 - b. What are super buffers? Explain inverting and non inverting nMOS super buffers. (10 Marks)
- 7
 - a. Describe 4 input tally circuits. (10 Marks)
 - b. Realize $(AB + CD) = y$ in i) NMOS ii) CMOS technology, using static AOI. (05 Marks)
 - c. Write a note on nMOS multiplxers. (05 Marks)
- 8
 - Discuss :
 - a. Regularity
 - b. Modularity
 - c. Locality
 - d. Standard cell
 - e. Full custom design. (20 Marks)
