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12EC047

M.Tech. Degree Examination, Dec.2014/Jan.2015

Low Power VLSI Design

Time: 3 hrs. Max. Marks: 100

Note: ***Answer any FIVE full questions.***

1 a. Explain the CMOS leakage currents. **(08 Marks)**
b. What are basic principles of low power design? **(08 Marks)**
c. Draw the energy band diagram of an unbiased MIS diode. **(04 Marks)**

2 a. With usual notations show that the short circuit power dissipation in a CMOS inverter is given by, $P_{SC} = \frac{\beta}{12}(V_{DD} - V_{tt})^3 \frac{\tau}{T}$. **(08 Marks)**
b. Explain the merits and demerits of SPICE power analysis. **(08 Marks)**
c. Explain hwo to calculate the internal switching energy. **(04 Marks)**

3 a. Explain the steps involved in event driven gate level power simulation. **(06 Marks)**
b. Explain the architectural level power model based on activities. **(08 Marks)**
c. Explain Monte-Carlo simulation. Derive the expression for number of sample to stop simulation. **(06 Marks)**

4 a. Along with expression, explain word-level and bit-level statistics. **(08 Marks)**
b. If P(a), P(b) and P(c) are input static probabilities, find the output static probability of y = ab+c by using Shannon's decomposition method. **(08 Marks)**
c. Define signal entropy. **(04 Marks)**

5 a. Explain sizing an inverter chain with relevant figures and expressions. **(10 Marks)**
b. Explain transistor network restructuring. **(10 Marks)**

6 a. Explain Bus invert encoding with suitable diagram. **(10 Marks)**
b. Explain transition analysis of state encoding with example. **(10 Marks)**

7 a. Explain basics of precomputation logic with example. **(10 Marks)**
b. What are design issues in precomputation logic techniques? **(10 Marks)**

8 Write short notes on:
a. Low power bus.
b. Charge recycling bus.
c. Single driver versus distributed buffers.
d. Design trade offs in state machine encoding. **(20 Marks)**

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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.