Chapter Exam

Appendix C-The Basics of Logic Design

2012/03/06

1. In Boolean algebra, there is a Consensus Theorem. Try to prove the following two equations are true. **(20%)**

i) $X \cdot Y + \sim X \cdot Z + Y \cdot Z = X \cdot Y + \sim X \cdot Z$

ii) $(X + Y) \cdot (\sim X + Z) = (Y + Z)$

2. Try to prove De Morgan's Laws using truth table. **(20%)**

$A \cdot B \equiv \sim (\sim A + \sim B)$

$A + B \equiv \sim (\sim A \cdot \sim B)$

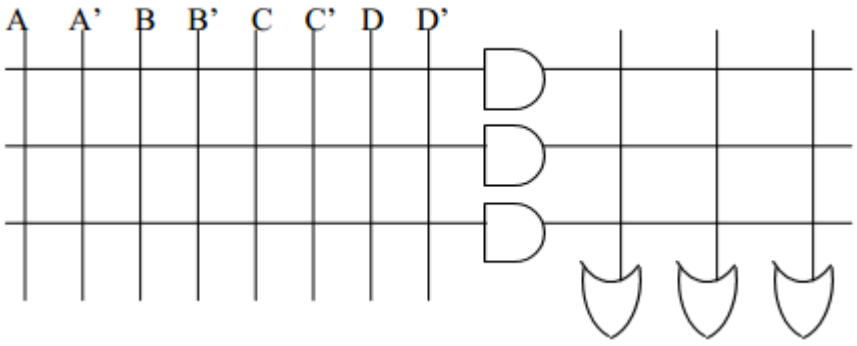
3. Implement the function F (A, B, C, D) = $A \cdot B + (\sim C \cdot \sim D)$.

i) 2-input AND and OR gates and inverters. **(5%)**

ii) 2-input NAND gates. **(5%)**

iii) 2-input NOR gates. **(5%)**

iv) An AND/OR PLA. **(10%)**



4. What are the differences between combinational logics and sequential logics? **(10%)**

5. Draw a 1-bit full adder using 2 1-bit half adder in combination logic with the **input** a, b, carry_in and with the **output** sum, carry_out. **(15%)**

6. Using the result of (5) to briefly draw out 32-bit adder. **(10%)**