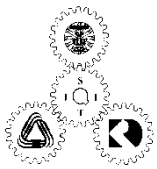

Sirindhorn International Institute of Technology

Thammasat University at Rangsit

School of Information, Computer and Communication Technology

ECS 371: Problem Set 3

Semester/Year: **1/2009**
Course Title: Digital Circuits
Instructor: Dr. Prapun Suksompong (prapun@siit.tu.ac.th)
Course Web Site: http://www.siit.tu.ac.th/prapun/ecs371/

Due date: July 9, 2009 (Thursday)

Please submit your homework to the instructor 3 minutes BEFORE your class starts.

Instructions

1. The questions are assigned from the following textbook:

   Thomas L. Floyd, *Digital Fundamentals*, 10th Edition, Pearson Education International (2009).

2. Only ONE of the problems will be graded. Of course, you do not know which problems will be selected; so you should work on all of them.
3. Late submission will not be accepted.
4. ***Write down all the steps*** that you have done to obtain your answers. You may not get full credit even when your answer is correct without showing how you get your answer.

Chapter 4

- 5(b,d), 26b, 30b, 32a, 34a, 44

5. Find the values of the variables that make each product term 1 and each sum term 0.

(a) AB **(b)** $A\overline{B}C$ **(c)** $A + B$ **(d)** $\overline{A} + B + \overline{C}$
(e) $\overline{A} + \overline{B} + C$ **(f)** $\overline{A} + B$ **(g)** $A\overline{B}\overline{C}$

24. Convert the following expressions to sum-of-product (SOP) forms:

(a) $AB + CD(A\overline{B} + CD)$ **(b)** $AB(\overline{B}\overline{C} + BD)$ **(c)** $A + B[AC + (B + \overline{C})D]$

26. Convert each SOP expression in Problem 24 to standard SOP form.

30. Convert each standard SOP expression in Problem 26 to standard POS form.

32. Develop a truth table for each of the following standard SOP expressions:

(a) $\overline{A}B\overline{C}D + \overline{A}BCD + A\overline{B}\,\overline{C}D + \overline{A}\,\overline{B}\,\overline{C}\,\overline{D}$

(b) $WXYZ + WXY\overline{Z} + \overline{W}XYZ + W\overline{X}YZ + WX\overline{Y}Z$

34. Develop a truth table for each of the standard POS expressions:

(a) $(\overline{A} + \overline{B} + \overline{C})(A + B + C)(A + \overline{B} + C)$

(b) $(\overline{A} + B + \overline{C} + D)(A + \overline{B} + C + \overline{D})(A + \overline{B} + \overline{C} + D)(\overline{A} + B + C + \overline{D})$

44. Use a Karnaugh map to reduce each expression to a minimum SOP form:

(a) $A + B\overline{C} + CD$

(b) $\overline{A}\,\overline{B}\,\overline{C}\,\overline{D} + \overline{A}\,\overline{B}\,\overline{C}D + ABCD + ABC\overline{D}$

(c) $\overline{A}B(\overline{C}\,\overline{D} + \overline{C}D) + AB(\overline{C}\,\overline{D} + \overline{C}D) + A\overline{B}\,\overline{C}D$

(d) $(\overline{A}\,\overline{B} + A\overline{B})(CD + C\overline{D})$

(e) $\overline{A}\,\overline{B} + A\overline{B} + \overline{C}\,\overline{D} + C\overline{D}$