King Fahd University of Petroleum and Minerals
College of Computer Sciences and Engineering
Department of Computer Engineering

COE 202 – Fundamentals of Computer Engineering (T102)

Homework # 04 (*due date & time: Saturday 23/04/2011 during class period*)

***** Show all your work. No credit will be given if work is not shown! *****

Problem # 1 (10 points):
Assume that both true and complement forms of the input variables are available. Provide an all-**NAND** implementation for the minimized expressions for the following:

i. **(5 points)** $F(A,B,C,D) = \sum m(0,1,2,3,6,7,10,11,14,15)$
ii. **(5 points)** $F(A,B,C,D) = \prod M(4,5,6,7,8,9,14,15)$

Problem # 2 (10 points):
Assume that both true and complement forms of the input variables are available. Provide an all-**NOR** implementation for the minimized expressions for the following:

i. **(5 points)** $F(A,B,C,D) = \sum m(0,1,2,3,6,7,10,11,14,15)$
ii. **(5 points)** $F(A,B,C,D) = \prod M(4,5,6,7,8,9,14,15)$

Problem # 3 (40 points):
Design a circuit that accepts two 2-bit unsigned numbers *A* (i.e. A_1A_0) and *B* (i.e. B_1B_0). The circuit produces $| A - B |$. Provide an all-**NOR** implementation of the circuit. Assume that both true and complement forms of the input variables are available.

Problem # 4 (10 points): Use a 4×16 **non-inverted-output decoder** and external gate(s) to implement the following function:

$$F(A,B,C,D) = \sum(2,3,5,6,8,9,14)$$

Problem # 5 (10 points): Repeat problem # 4 but use a **4×16 inverted-output decoder** and external gate(s).

Problem # 6 (10 points): Repeat problem # 4 but use a **16×1 MUX** and external gate(s).

Problem # 7 (10 points): Repeat problem # 4 but use an **8×1 MUX** and external gate(s). Connect ***C, A,* and *D*** to S_2, S_1, and S_0, respectively.