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

COE 202 – Digital Logic Design (T161)

Homework # 04 (*due date & time: Tuesday 29/11/2016 during class period*)

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

Problem # 1 (20 points): Use a 4×16 **decoder** and external gate(s) to implement the following function:

$$F(A, B, C, D) = A.(\overline{C} + \overline{D}).(\overline{B} + \overline{D})$$

Problem # 2 (20 points): Repeat problem # 1 but use a **16×1 MUX** and external gate(s).

Problem # 3 (20 points): Repeat problem # 1 but use an **8×1 MUX** and external gate(s). Connect *C, B,* **and** *D* to S_2, S_1, and S_0, respectively.

Problem # 4 (40 points): Using <u>minimal</u> standard components such as decoders, multiplexers, adders, subtractors, and/or comparators, and any other necessary logic gates design a circuit that takes two 4-bit binary numbers $A = A_3A_2A_1A_0$ and $B = B_3B_2B_1B_0$ and a 2-bit user selection input $S = S_1S_0$. The circuit should produce a 5-bit output $O = O_4O_3O_2O_1O_0$ according to the following table:

S_1S_0	O is equal to
00	Max(A, B)
01	Min(A, B)
10	$2 \times A$
11	$\lvert A - B \rvert$ (i.e. absolute value of $(A - B)$)

Note that you don't need to show the internal implementation of the MSI components used in your design. **Properly label all components, their inputs and outputs.**