

Midterm exam DITE: Wednesday, Oct 24, 2012 -- 10:00 to 13:00h

Task I: Simplify the Boolean function $F(w,x,y,z) = \sum m(0,3,5,7,11,13)$ which has the don't-care conditions $d(w,x,y,z) = \sum m(4,6,14,15)$ by finding all prime implicants and essential prime implicants and applying the selection rule. Note that function **F** has **don't care** conditions **d** that you have to take into account when simplifying function **F**. After you have simplified the function, represent it using the **logic basis NOR**. Also, draw the combinational logic circuit corresponding to the function **using only 2-input NOR gates**.

Important: Show all prime implicants and essential prime implicants as well as explain all the steps you do to simplify and represent function F.

Task II: Let be given the Boolean function $F2(w,x,y,z) = \sum m(4,5,12,13)$.

Implement F under the following conditions:

1. Use **only** multiplexers 2-to-1 (**gates must not be used!**);
2. The number of multiplexers used in your implementation **must be as small as possible**.

Important: Show and explain all the steps you do to implement $F2(w,x,y,z)$.

Task III: Design a 3-to-8 Decoder using **only** 1-to-2 Decoders with enable (**gates must not be used!**).

Important: Show and explain all the steps you do to design the 3-to-8 Decoder.