Universidad de Huelva

Computer Fundamentals

1st Year of Bachelor in Computer Science Engineering

Practice 1

Realization of logic functions with SSI devices (I)

Simulation in Digital Works and assembly

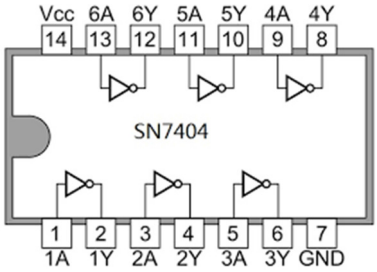
Academic year 2020/2021

Goals

- Verification of the equivalence between the two canonical expressions of a function
- Complexity checking of the circuits related to the canonical expressions of a function.
- Introduction to the simulation software Digital Works.
- Initiation in the implementation of functions through logic gates.

Available material

- PC equipped with the software package Digital Works 3.0.5.0.
- Practice board Sidac GPT 783 71.
- Inverters (I.C. 7404).
- 3-input AND gates (I.C. 7411).
- 2-input OR gates (I.C. 7432).



Specifications

Given the function:

$$Z\,(D, E, F) = \sum_3 (0, 1, 4, 7)$$

- This practice aims at checking that their two canonical expressions have an equivalent behaviour in stationary approach.

Operating process

1. Represent the truth table concerning to this function, placing the input variables in the following order: **DEF**.
2. Obtain from the truth table the non-numerical disjunctive canonical expression of the function.
3. Draw in Digital Works the **logic diagram** of the disjunctive canonical expression of the function and simulate it, contrasting the results obtained in the first exercise.
4. Draw in Digital Works the **hardware diagram** of the disjunctive canonical expression of the function and simulate it, contrasting the results obtained in the first exercise.
5. Implement in the laboratory the circuit related to the disjunctive canonical expression of the function, checking the value of the outputs for every combination of the input variables.
6. Obtain from the truth table the non-numerical conjunctive canonical expression of the function.
7. Draw in Digital Works the **logic diagram** of the conjunctive canonical expression of the function and simulate it, contrasting the results obtained in the first exercise.
8. Draw in Digital Works the **hardware diagram** of the conjunctive canonical expression of the function and simulate it, contrasting the results obtained in the first exercise.
9. Implement in the laboratory the circuit related to the conjunctive canonical expression of the function, checking the value of the outputs for every combination of the input variables.