ΜΗΧΑΝΙΚΩΝ Η/Υ ΚΑΙ ΠΛΗΡΟΦΟΡΙΚΗΣ

ΤΡΙΤΗ ΕΡΓΑΣΤΗΡΙΑΚΗ ΑΣΚΗΣΗ
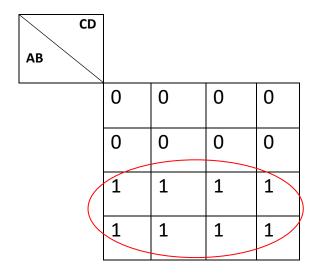
Μέρος 1ο: Μετατροπή κώδικα Gray σε δυαδικό,

ΠΙΝΑΚΑΣ ΑΛΗΘΕΙΑΣ :

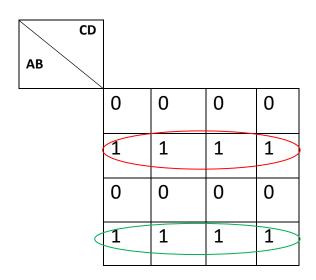|	Κώδικας Gray			⇔		Δυαδικό	
A	**B**	**C**	**D**	**F**	**F1**	**F2**	**F3**
0	0	0	0	0	0	0	0
0	0	0	1	0	0	0	1
0	0	1	1	0	0	1	0
0	0	1	0	0	0	1	1
0	1	1	0	0	1	0	0
0	1	1	1	0	1	0	1
0	1	0	1	0	1	1	0
0	1	0	0	0	1	1	1
1	1	0	0	1	0	0	0
1	1	0	1	1	0	0	1
1	1	1	1	1	0	1	0
1	1	1	0	1	0	1	1
1	0	1	0	1	1	0	0
1	0	1	1	1	1	0	1
1	0	0	1	1	1	1	0
1	0	0	0	1	1	1	1

Χάρτες Karnaugh :

CD				
AB				
	0	0	0	0
	0	0	0	0
	1	1	1	1
	1	1	1	1

F = $\underline{A}$

CD				
AB				
	0	0	0	0
	1	1	1	1
	0	0	0	0
	1	1	1	1

F1 = A'B + AB' = $\underline{A \oplus B}$

	CD			
AB	0	0	1	1
	1	1	0	0
	0	0	1	1
	1	1	0	0

	CD			
AB	0	1	0	1
	1	0	1	0
	0	1	0	1
	1	0	1	0

F2 = A'B'C + A'BC' + ABC + AB'C' = <u>A ⊕ B ⊕ C</u>

F3 = A'B'C'D+A'B'CD'+A'BC'D'+A'BCD+ABC'D+ABCD'+

+ AB'C'D+AB'CD= <u>A ⊕ B ⊕ C ⊕ D</u>

<u>Το Κύκλωμα :</u>

ⓘ   Command: quartus_eda --read_settings_files=off --write_settings_files=off Question1 -c Question1
ⓘ 204026 Generated files "Question1.vho", "Question1_fast.vho", "Question1_vhd.sdo" and "Question1_vhd_fast.sdo" in directory "C:/altera/13
ⓘ   Quartus II 64-Bit EDA Netlist Writer was successful. 0 errors, 0 warnings
ⓘ 293000 Quartus II Full Compilation was successful. 0 errors, 12 warnings

Name	Value at 0 ps															
∨ Gray	B 0000	0000	0001	0011	0010	0110	0111	0101	0100	1100	1101	1111	1110	1010	1011	1001	1000
A	B 0															
B	B 0															
C	B 0															
D	B 0															
∨ Binary	U 0	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
F	U 0															
F1	U 0															
F2	U 0															
F3	U 0															

Μέρος 2ο: Κώδικας BCD και συμπλήρωμα ως προς 9

Πίνακας Αλήθειας :

	Κώδικας BCD			⇔		Συμπλήρωμα ως προς 9		Error

A	B	C	D	F	F1	F2	F3	F4
0	0	0	0	1	0	0	1	0
0	0	0	1	1	0	0	0	0
0	0	1	0	0	1	1	1	0
0	0	1	1	0	1	1	0	0
0	1	0	0	0	1	0	1	0
0	1	0	1	0	1	0	0	0
0	1	1	0	0	0	1	1	0
0	1	1	1	0	0	1	0	0
1	0	0	0	0	0	0	1	0
1	0	0	1	0	0	0	0	0
1	0	1	0	X	X	X	X	1
1	0	1	1	X	X	X	X	1
1	1	0	0	X	X	X	X	1
1	1	0	1	X	X	X	X	1
1	1	1	0	X	X	X	X	1
1	1	1	1	X	X	X	X	1

AB \ CD				
0	0	1	1
0	0	1	1
X	x	x	x
0	0	x	x

F2 = $\underline{C}$

AB \ CD				
1	0	0	1
1	0	0	1
X	X	x	x
1	0	x	X

F3 = $\underline{D'}$

First K-map:

AB\CD				
	1	1	0	0
	0	0	0	0
	x	x	x	X
	0	0	x	X

F=A'B'C' = (A+B+C)'

Second K-map:

AB\CD				
	0	0	1	1
	1	1	0	0
	X	x	x	x
	0	0	x	x

F1 = B'C + BC' = B⊕C

0	0	0	0
0	0	0	0
1	1	1	1
0	0	1	1

CD

AB

F4 = **ABC'D'+ABC'D+ABCD+ABCD'+AB'CD+AB'CD+AB'CD'**=

=**ABC'+ABC+AB'C=AB+AC**

Το κύκλωμα :

Command: quartus_eda --read_settings_files=off --write_settings_files=off Question2 -c Question2
204026 Generated files "Question2.vho", "Question2_fast.vho", "Question2_vhd.sdo" and "Question2_vhd_fast.sdo" in directory "C:/altera/13.0sp1/digital di/exercise_3/question2/simulati
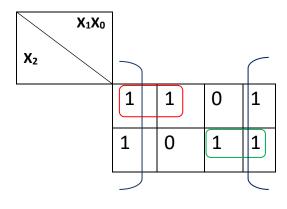Quartus II 64-Bit EDA Netlist Writer was successful. 0 errors, 0 warnings
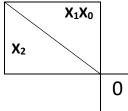293000 Quartus II Full Compilation was successful. 0 errors, 12 warnings

Μέρος 3ο: Σχεδίαση Αριθμητικής Συνάρτησης

Πίνακας Αληθείας:

X_2	X_1	X_0	Y_3	Y_2	Y_1	Y_0
0	0	0	1	0	1	0
0	0	1	1	0	1	1
0	1	0	1	1	1	0
0	1	1	0	0	1	1
1	0	0	1	0	1	0
1	0	1	0	0	1	1
1	1	0	1	1	1	0
1	1	1	1	0	1	1

	X_1X_0			
X_2				
	1	1	0	1
	1	0	1	1

$Y_3 = \chi0' + \chi2'\chi1' + \chi2\chi1 = \chi0' + (\chi1 \odot x2)$

	X_1X_0			
X_2				
	0	0	0	1
	0	0	0	1

$Y_2 = \chi1\chi0'$

X₂ \ X₁X₀				
1	1	1	1
1	1	1	1

$Y_1 = 1 (\tau\alpha\upsilon\tau o\lambda o\gamma\iota\alpha)$
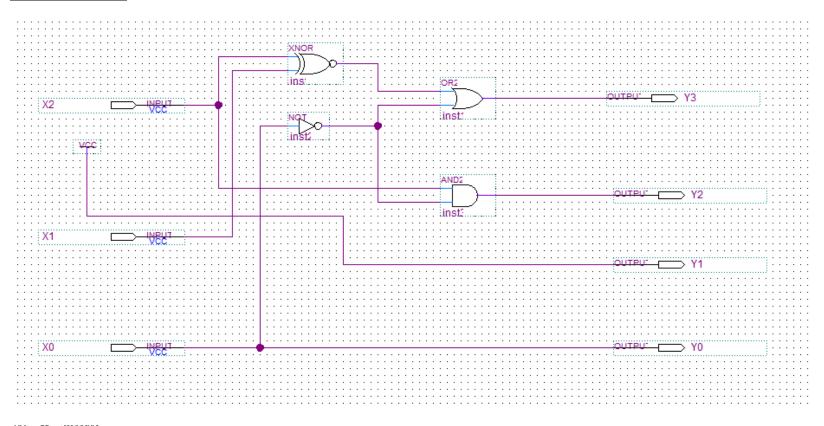
X₂ \ X₁X₀				
0	1	1	0
0	1	1	0

$Y_0 = x0$

Το κύκλωμα :

       Command: quartus_eda --read_settings_files=off --write_settings_files=off Question3 -c Question3
204026 Generated files "Question3.vho", "Question3_fast.vho", "Question3_vhd.sdo" and "Question3_vhd_fast.sdo" in directory "C:/altera/13.0sp1/digital di/exercise_3/question3/simula
       Quartus II 64-Bit EDA Netlist Writer was successful. 0 errors, 0 warnings
293000 Quartus II Full Compilation was successful. 0 errors, 14 warnings

Name	Value at 0 ps
X0	B 0
X1	B 0
X2	B 0
Y0	B 0
Y1	B 1
Y2	B 0
Y3	B 1

0 ps   80.0 ns   160.0 ns   240.0 ns   320.0 ns   400.0

0 ps