ΓΙΩΡΓΟΣ ΧΑΤΖΗΛΙΓΟΣ ΑΜ4835 2ο ΕΤΟΣ

7ο ΕΡΓΑΣΤΗΡΙΟ

ΑΣΚΗΣΗ 1:

Present State				Next State			
A_3	**A_2**	**A_1**	**A_0**	**A_3**	**A_2**	**A_1**	**A_0**
0	0	0	0	1	0	0	0
X	X	X	X	X	X	X	X
X	X	X	X	X	X	X	X
0	0	1	1	1	0	0	1
0	1	0	0	1	0	1	0
0	1	0	1	1	0	1	1
0	1	1	0	1	1	0	0
0	1	1	1	1	1	0	1
1	0	0	0	1	1	1	0
1	0	0	1	1	0	0	0
1	0	1	0	0	0	1	1
1	0	1	1	0	1	0	0
1	1	0	0	0	1	0	1
1	1	0	1	0	1	1	0
1	1	1	0	0	1	1	1
1	1	1	1	1	0	0	0

FF INPUTS			
D3	**D2**	**D1**	**D0**
1	0	0	0
X	X	X	X
X	X	X	X
1	0	0	1
1	0	1	0
1	0	1	1
1	1	0	0
1	1	0	1
1	1	1	0
1	0	0	0
0	0	1	1
0	1	0	0
0	1	0	1
0	1	1	0
0	1	1	1
1	0	0	0

ΘΑ ΧΡΗΣΙΜΟΠΟΙΗΣΩ 4 ΧΑΡΤΕΣ KARNAUGH ΓΙΑ ΤΗΝ ΑΠΛΟΠΟΙΗΣΗ ΤΩΝ ΕΞΟΔΩΝ D3,D2,D1,D0

Για D3:

A1A0 A3A2	00	01	11	10
00	**1**	-	**1**	-
01	**1**	**1**	**1**	**1**
11	0	0	**1**	0
10	**1**	**1**	0	0

D3= A3’ + A2’A1’ + A2A1A0

Για A2:

A1A0 A3A2	00	01	11	10
00	0	-	0	-
01	0	0	**1**	**1**
11	**1**	**1**	0	**1**
10	**1**	0	**1**	0

D2= A3’A2A1 + A3A1’A0’ + A3A2’A1A0 + A3A2A1’ + A2A1A0’

Για A1:

A1A0 A3A2	00	01	11	10
00	0	-	0	-
01	**1**	**1**	0	0
11	0	**1**	0	**1**
10	**1**	0	0	**1**

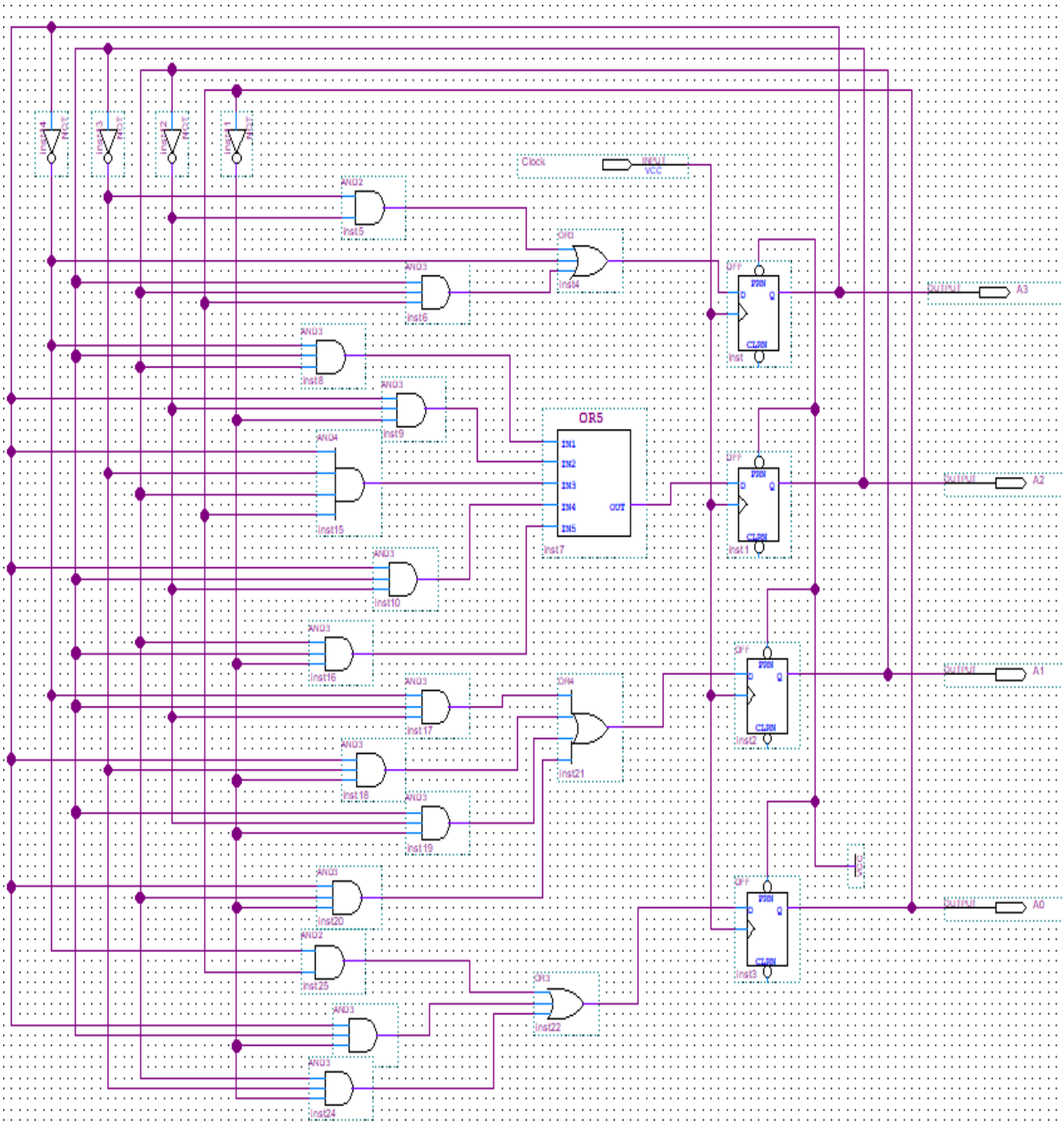
D1= A3'A2A1' + A3A2'A0' + A2A1'A0 + A3A1A0'

A1A0 A3A2	00	01	11	10
00	0	-	**1**	-
01	0	**1**	**1**	0
11	**1**	0	0	**1**
10	0	0	0	**1**

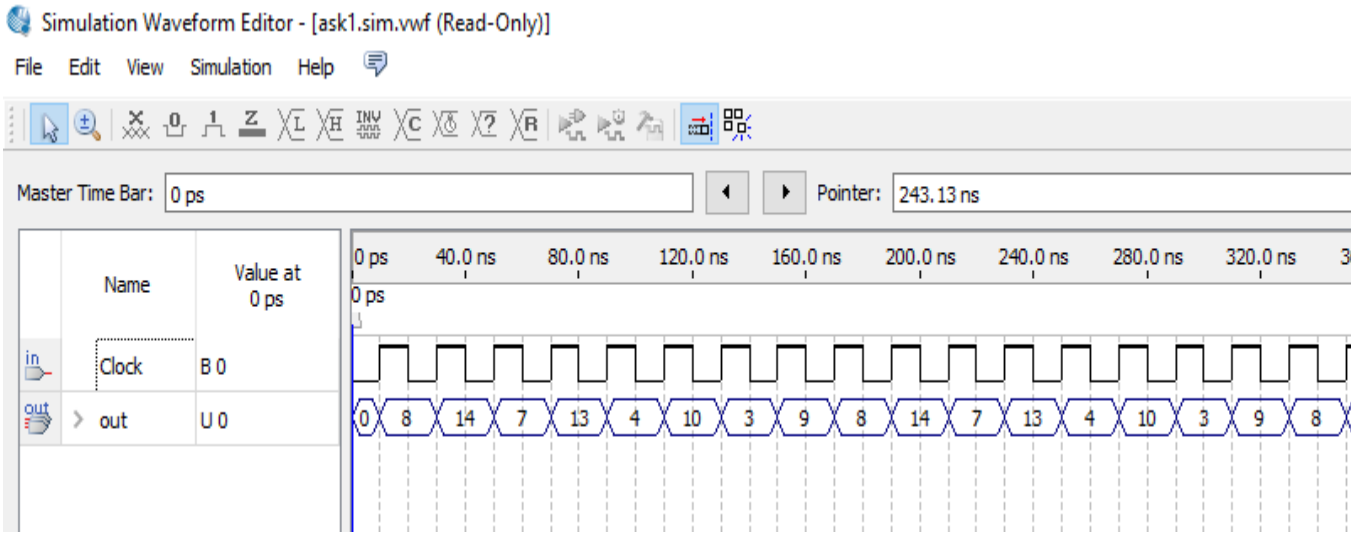
[3]

Για A0:

D0= A3'A0 + A3A2A0' + A2'A1A0'



ΤΟ ΔΙΑΓΡΑΜΜΑ ΕΙΝΑΙ ΑΥΤΟΜΑΤΗΣ ΔΙΟΡΘΩΣΗΣ ΔΙΟΤΙ ΔΕΝ ΠΑΓΙΔΕΥΕΤΑΙ


Simulation Waveform Editor - [ask1.sim.vwf (Read-Only)]
File Edit View Simulation Help
Master Time Bar: 0 ps
Pointer: 243.13 ns
Name
Value at 0 ps
Clock
B 0
out
U 0
0 ps 40.0 ns 80.0 ns 120.0 ns 160.0 ns 200.0 ns 240.0 ns 280.0 ns 320.0 ns
0 ps
0 8 14 7 13 4 10 3 9 8 14 7 13 4 10 3 9 8

ΕΡΩΤΗΣΗ 2

TO Q0=B KAI TO Q1=A

PRESENT STATE		NEXT STATE			FF INPUTS			
Q1	Q0	Q1	Q0	E	J1	K1	J0	K0
0	0	0	1	0	0	X	1	X
0	0	1	1	1	1	X	1	X
0	1	1	0	0	1	X	X	1
1	1	1	0	1	X	0	X	1
1	0	1	1	0	X	0	1	X
1	0	0	1	1	X	1	1	X
1	1	0	0	0	X	1	X	1
0	1	0	0	1	0	X	X	1

Κανω πινακα Karnaugh για όλα τα ff inputs J1,K1,J0,K0

Q1 \ E Q0	00	01	11	10
00	0	1	0	1
01	X	X	X	X

APA , J1= Q0'E+E'Q0' =E⊕Q0

Q1 \ E Q0	00	01	11	10
00	X	X	X	X
01	0	1	0	1

APA, K1= Q0'E+E'Q0' =E⊕Q0

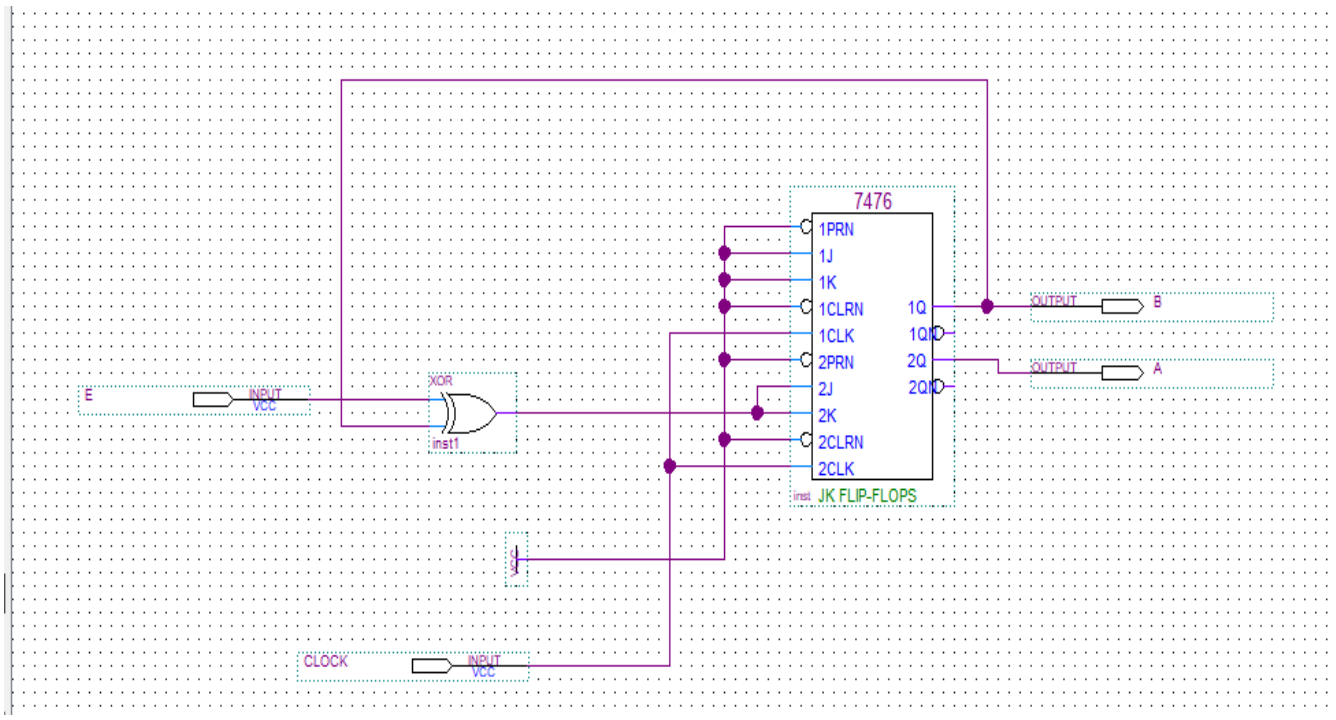
Q1 \ E Q0	00	01	11	10
00	1	1	X	X
01	1	1	X	X

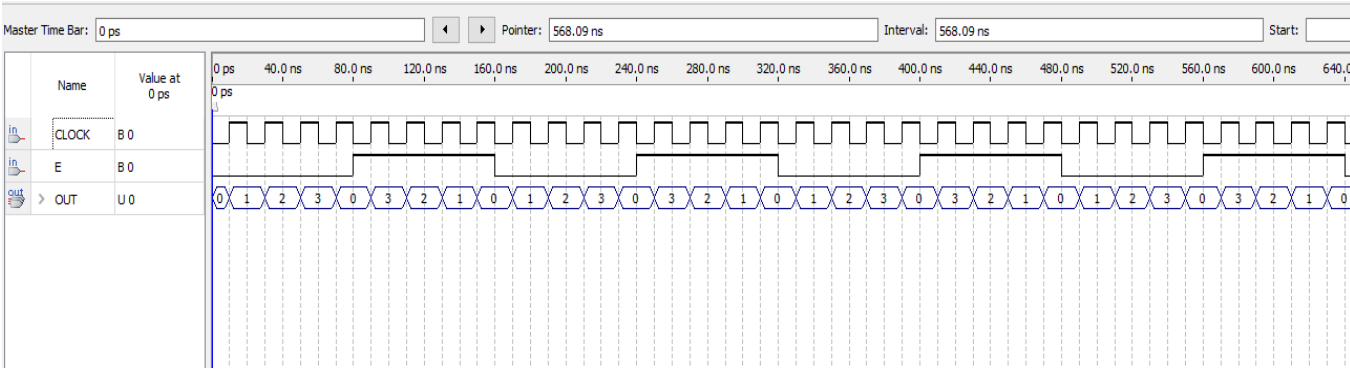
APA, J0 =1

Q1 \ E Q0	00	01	11	10
00	X	X	1	1
01	X	X	1	1

APA ,K0=1

[7]


7476
1PRN
1J
1K
1CLRN
1CLK
2PRN
2J
2K
2CLRN
2CLK
1Q
1QN
2Q
2QN
JK FLIP-FLOPS
OUTPUT
B
OUTPUT
A
E
INPUT
VCC
XOR
inst1
CLOCK
INPUT
VCC


Master Time Bar: 0 ps
Pointer: 568.09 ns
Interval: 568.09 ns
Start:
Name
Value at 0 ps
CLOCK
B 0
E
B 0
OUT
U 0
0 ps
40.0 ns
80.0 ns
120.0 ns
160.0 ns
200.0 ns
240.0 ns
280.0 ns
320.0 ns
360.0 ns
400.0 ns
440.0 ns
480.0 ns
520.0 ns
560.0 ns
600.0 ns

ΑΣΚΗΣΗ 3

PRESENT STATE				E	NEXT STATE				FF INPUTS							
A3	A2	A1	A0	[redacted]	A3	A2	A1	A0	J3	K3	J2	K2	J1	K1	J0	K0
0	0	0	0	0	0	0	0	1	0	X	0	X	0	X	1	X
0	0	0	0	1	1	1	1	1	1	X	1	X	1	X	X	0
0	0	0	1	0	0	0	1	0	0	X	0	X	1	X	0	X
0	0	0	1	1	0	0	0	0	0	X	0	X	X	0	1	X
0	0	1	0	0	0	0	1	1	0	X	0	X	X	0	1	X
0	0	1	0	1	0	0	0	1	0	X	0	X	X	1	X	0
0	0	1	1	0	0	1	0	0	0	X	1	X	X	1	0	X
0	0	1	1	1	0	0	1	0	0	X	0	X	X	0	X	1
0	1	0	0	0	0	1	0	1	0	X	X	0	0	X	1	X
0	1	0	0	1	0	0	1	1	0	X	X	1	1	X	X	0
0	1	0	1	0	0	1	1	0	0	X	X	0	1	X	0	X
0	1	0	1	1	0	1	0	0	0	X	X	0	0	X	X	1
0	1	1	0	0	0	1	1	1	0	X	X	0	X	0	1	X
0	1	1	0	1	0	1	0	1	0	X	X	0	X	1	X	0
0	1	1	1	0	1	0	0	0	1	X	X	1	X	1	0	X
0	1	1	1	1	0	1	1	0	0	X	X	0	X	0	X	1
1	0	0	0	0	1	0	0	1	X	0	0	X	0	X	1	X
1	0	0	0	1	0	1	1	1	X	1	1	X	1	X	X	0
1	0	0	1	0	1	0	1	0	X	0	0	X	1	X	0	X
1	0	0	1	1	1	0	0	0	X	0	0	X	0	X	X	1
1	0	1	0	0	1	0	1	1	X	0	0	X	X	0	1	X
1	0	1	0	1	1	0	0	1	X	0	0	X	X	1	X	0
1	0	1	1	0	1	1	0	0	X	0	1	X	X	1	0	X
1	0	1	1	1	1	0	1	0	X	0	0	X	X	0	X	1
1	1	0	0	0	1	1	0	1	X	0	X	1	1	X	X	0
1	1	0	0	1	1	0	1	1	X	0	X	1	1	X	X	0
1	1	0	1	0	1	1	1	0	X	0	X	0	1	X	0	X
1	1	0	1	1	1	1	0	0	X	0	X	0	0	X	X	1
1	1	1	0	0	1	1	1	1	X	0	X	0	X	0	1	X
1	1	1	0	1	1	1	0	1	X	1	X	1	X	1	0	X
1	1	1	1	0	0	0	0	0	X	1	X	1	X	1	0	X
1	1	1	1	1	1	1	1	0	X	0	X	0	X	0	X	1

Θα χρησιμοποιησω χαρτες karnaugh για την ευρεση του J3,K3,J2,K2,J1,K1,J0,K0

A2A3/A1A0E	000	001	011	010	110	111	101	100
00	0	1	0	0	0	0	0	0
01	0	0	0	0	1	0	0	0
11	X	X	X	X	X	X	X	X
10	X	X	X	X	X	X	X	X

J3=A2’A1’A0’E + A2A1A0E’

A2A3/A1A0E	000	001	011	010	110	111	101	100
00	X	X	X	X	X	X	X	X
01	X	X	X	X	X	X	X	X
11	0	0	0	0	1	0	00	0
10	0	1	0	0	0	0	0	0

K3=A2’A1’A0’E + A2A1A0E’

A2A3/A1A0E	000	001	011	010	110	111	101	100
00	0	1	0	0	1	0	0	0
01	X	X	X	X	X	X	X	X
11	X	X	X	X	X	X	X	X
10	0	1	0	0	1	0	0	0

J2=A1’A0’E+A1A0E’

A2A3/A1A0E	000	001	011	010	110	111	101	100
00	X	X	X	X	X	X	X	X
01	0	1	0	0	1	0	0	0
11	0	1	0	0	1	0	0	0
10	X	X	X	X	X	X	X	X

K2=A1’A0’E + A1A0E’

A2A3/A1A0E	000	001	011	010	110	111	101	100
00	0	1	0	1	X	X	X	X
01	0	1	0	1	X	X	X	X
11	0	1	0	1	X	X	X	X

10	0	1	0	1	X	X	X	X

J1=A0’E+A0E’

A2A3/A1A0E	000	001	011	010	110	111	101	100
00	X	X	X	X	1	0	1	0
01	X	X	X	X	1	0	1	0
11	X	X	X	X	1	0	1	0
10	X	X	X	X	1	0	1	0

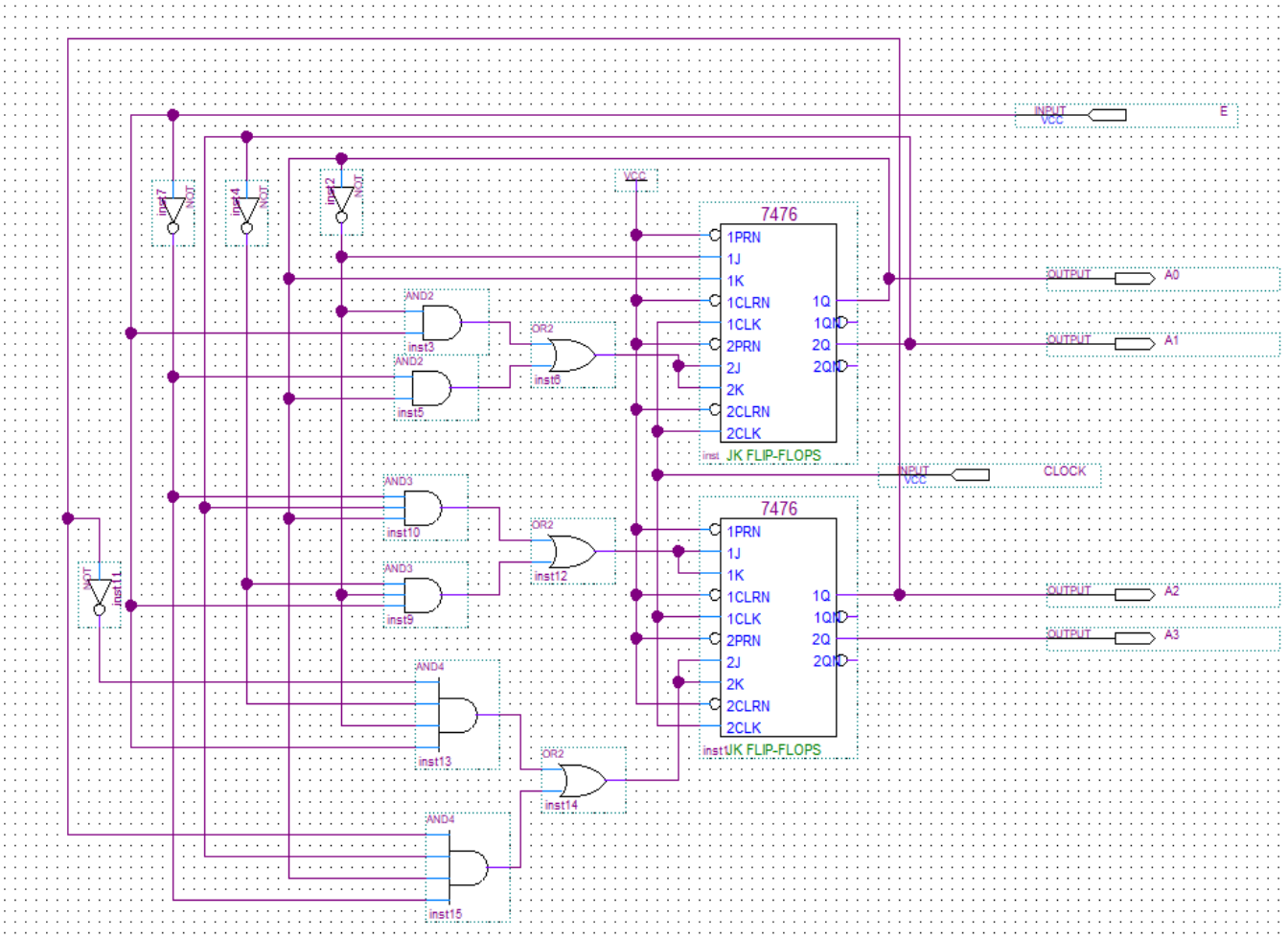
K1= A0’E+A0E’

A2A3/A1A0E	000	001	011	010	110	111	101	100
00	1	X	X	0	0	X	X	1
01	1	X	X	0	0	X	X	1
11	1	X	X	0	0	X	X	1
10	1	X	X	0	0	X	X	1

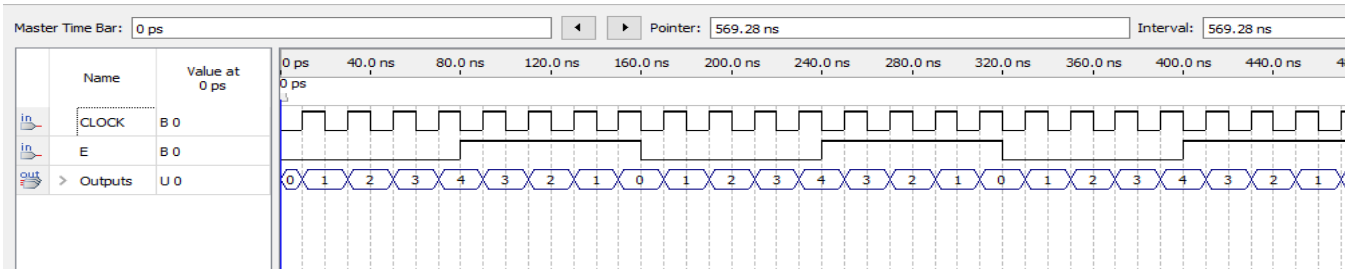
J0=A0’

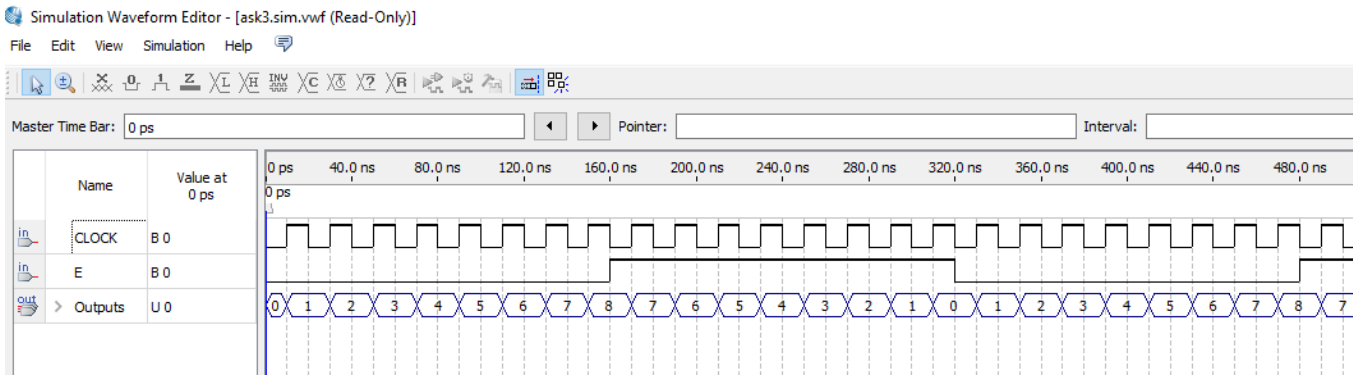
A2A3/A1A0E	000	001	011	010	110	111	101	100
00	X	0	1	X	X	1	0	X
01	X	0	1	X	X	1	0	X
11	X	0	1	X	X	1	0	X
10	X	0	1	X	X	1	0	X

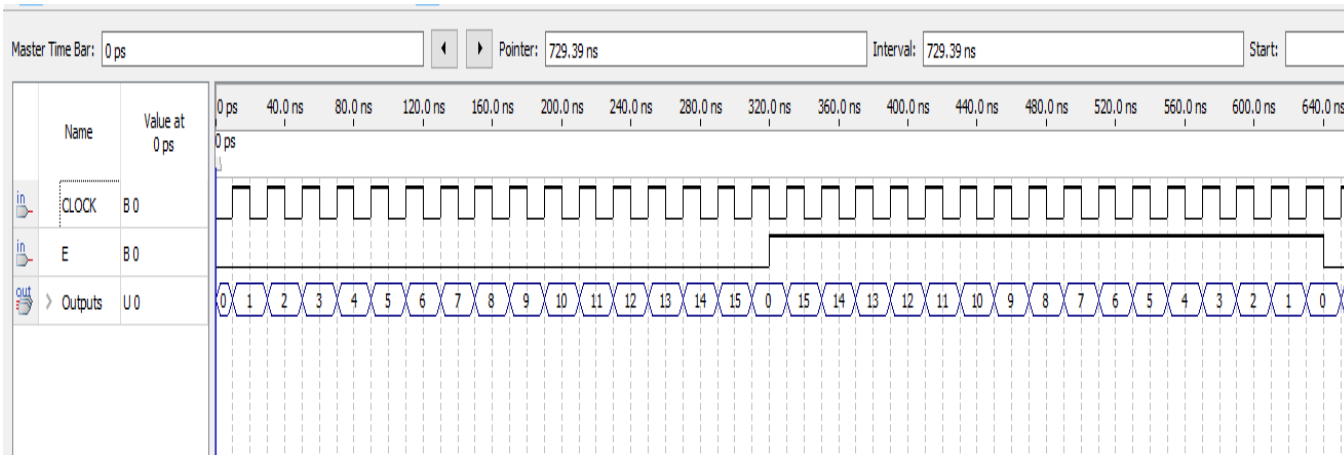
K0=A0



Παρατηρω ότι αυξανοντας τα ns της E το waveform θα αναπαραστησει περισσοτερες τιμες στις εξοδους μας οποτε κανω μια εξομοιωση με τιμη E=80ns , μια εξομοιωση με E=160ns, E=320ns




Simulation Waveform Editor - [ask3.sim.vwf (Read-Only)]
File Edit View Simulation Help
Master Time Bar: 0 ps
Pointer:
Interval:
Name
Value at 0 ps
CLOCK
B 0
E
B 0
Outputs
U 0
0 ps 40.0 ns 80.0 ns 120.0 ns 160.0 ns 200.0 ns 240.0 ns 280.0 ns 320.0 ns 360.0 ns 400.0 ns 440.0 ns 480.0 ns
0 1 2 3 4 5 6 7 8 7 6 5 4 3 2 1 0 1 2 3 4 5 6 7 8 7


Master Time Bar: 0 ps
Pointer: 729.39 ns
Interval: 729.39 ns
Start:
Name
Value at 0 ps
CLOCK
B 0
E
B 0
Outputs
U 0
0 ps 40.0 ns 80.0 ns 120.0 ns 160.0 ns 200.0 ns 240.0 ns 280.0 ns 320.0 ns 360.0 ns 400.0 ns 440.0 ns 480.0 ns 520.0 ns 560.0 ns 600.0 ns 640.0 ns
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 0 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0