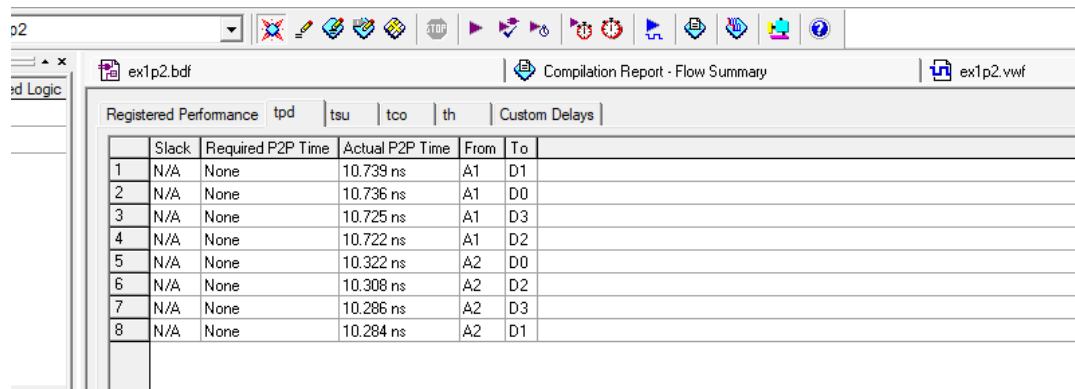


QUARTUS EXERCISE 1

Part 1

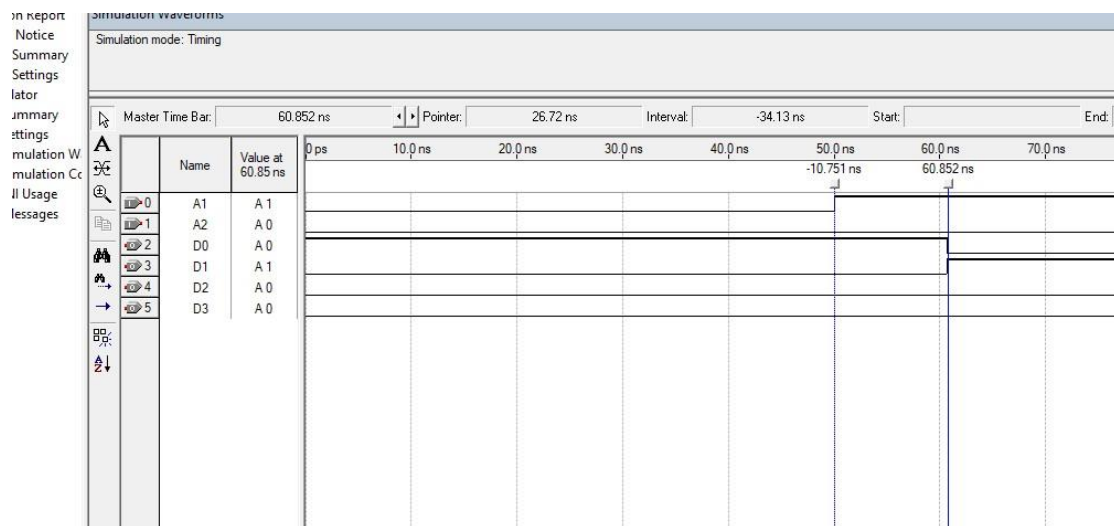
Question 1



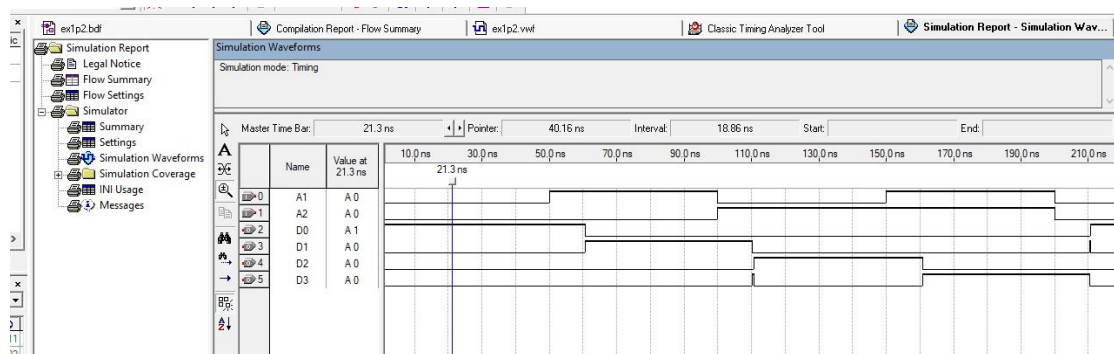
The screenshot shows the 'Registered Performance' tab in the Quartus II Performance Summary window. It displays a table with 8 rows of performance data. The columns are: Slack, Required P2P Time, Actual P2P Time, From, and To. The 'Actual P2P Time' column shows values ranging from 10.722 ns to 10.739 ns. The 'From' and 'To' columns indicate the source and destination of the data paths.

| | Slack | Required P2P Time | Actual P2P Time | From | To |
|---|-------|-------------------|-----------------|------|----|
| 1 | N/A | None | 10.739 ns | A1 | D1 |
| 2 | N/A | None | 10.736 ns | A1 | D0 |
| 3 | N/A | None | 10.725 ns | A1 | D3 |
| 4 | N/A | None | 10.722 ns | A1 | D2 |
| 5 | N/A | None | 10.322 ns | A2 | D0 |
| 6 | N/A | None | 10.308 ns | A2 | D2 |
| 7 | N/A | None | 10.286 ns | A2 | D3 |
| 8 | N/A | None | 10.284 ns | A2 | D1 |

Max delay 10.739ns



delay with time bars



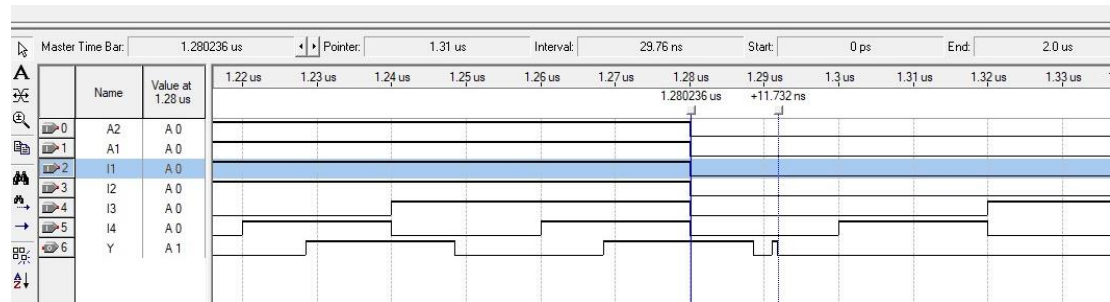
waveform

παρατηρούμε πώς λειτουργεί σύμφωνα με τους κανόνες του αποκωδικοποιητή

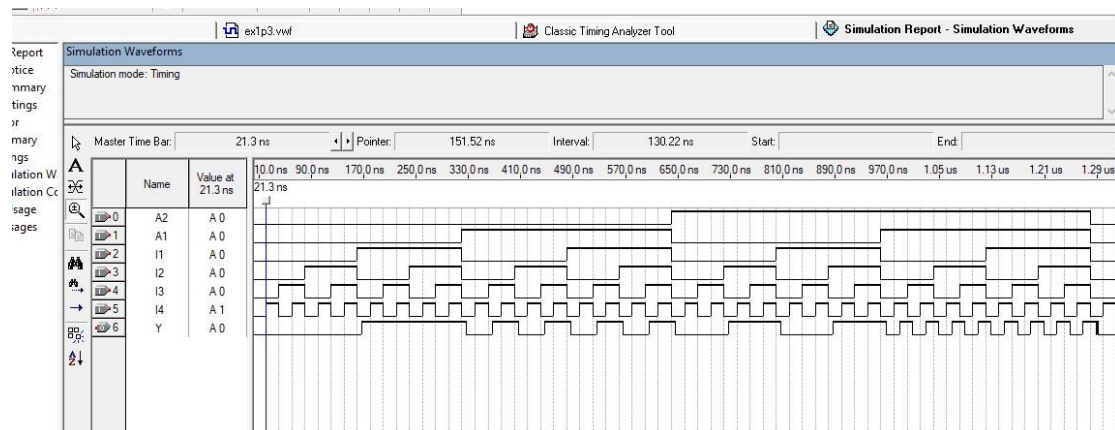
Question 2

| ex1p3.bdf | | | | | | |
|---|-------|-------------------|-----------------|------|----|--|
| Compilation Report - Flow Summary | | | | | | |
| Classic Timing Analyzer Tool | | | | | | |
| Registered Performance tpd tsu tco th Custom Delays | | | | | | |
| | Slack | Required P2P Time | Actual P2P Time | From | To | |
| 1 | N/A | None | 11.784 ns | A1 | Y | |
| 2 | N/A | None | 11.690 ns | A2 | Y | |
| 3 | N/A | None | 8.502 ns | I4 | Y | |
| 4 | N/A | None | 7.477 ns | I2 | Y | |
| 5 | N/A | None | 7.290 ns | I1 | Y | |
| 6 | N/A | None | 6.624 ns | I3 | Y | |

Max delay time 11.784



Delay with time bars



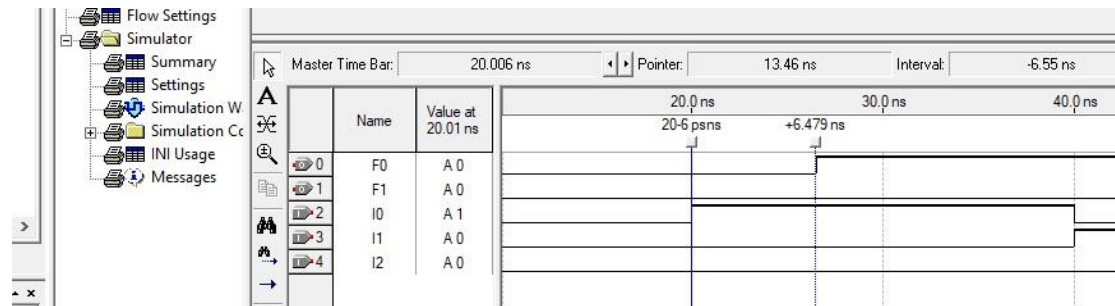
Waveform

Παρατηρούμε πως λειτουργεί σύμφωνα με τον πίνακα

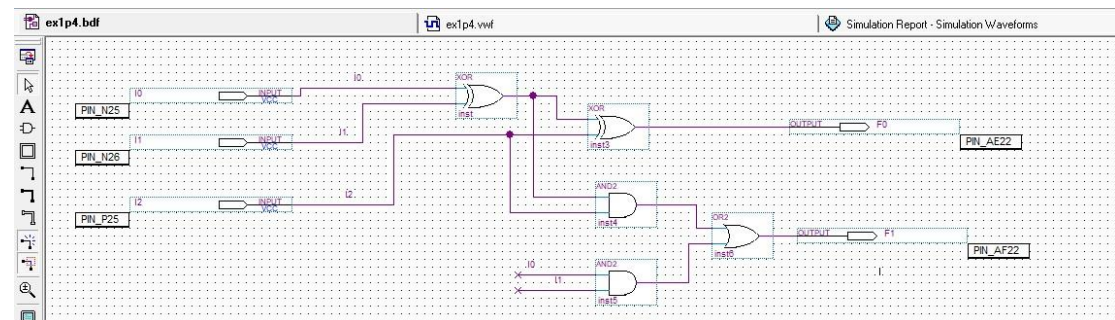
Question 3

| Registered Performance | | | | | | |
|------------------------|-------|-------------------|-----------------|------|----|---------------|
| | Slack | Required P2P Time | Actual P2P Time | From | To | Custom Delays |
| 1 | N/A | None | 6.813 ns | I1 | F1 | |
| 2 | N/A | None | 6.633 ns | I1 | F0 | |
| 3 | N/A | None | 6.633 ns | I0 | F1 | |
| 4 | N/A | None | 6.516 ns | I0 | F0 | |
| 5 | N/A | None | 6.503 ns | I2 | F1 | |
| 6 | N/A | None | 6.381 ns | I2 | F0 | |

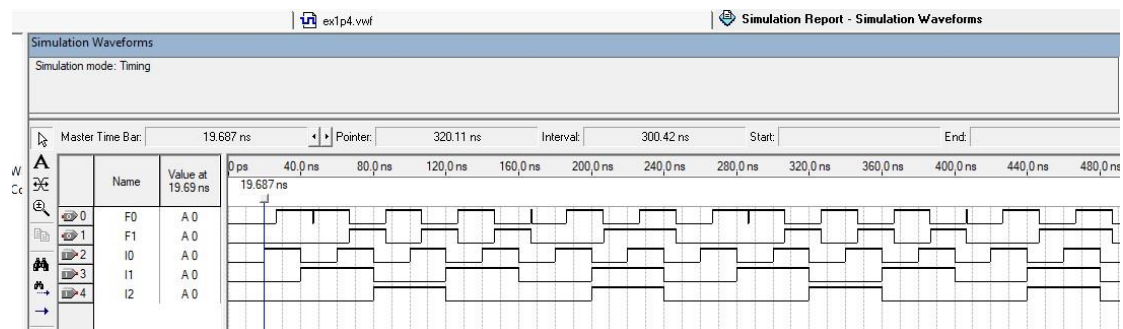
Max delay time 6.813ns



Delay with time bars



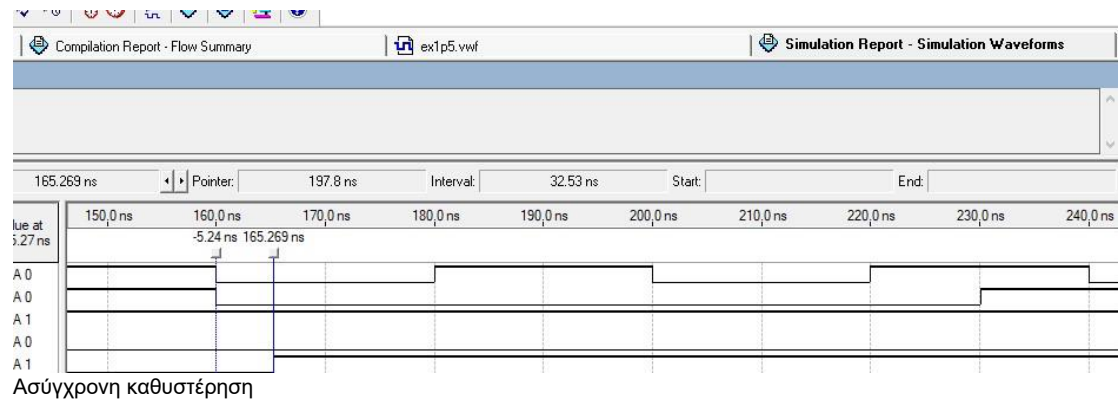
Schematic



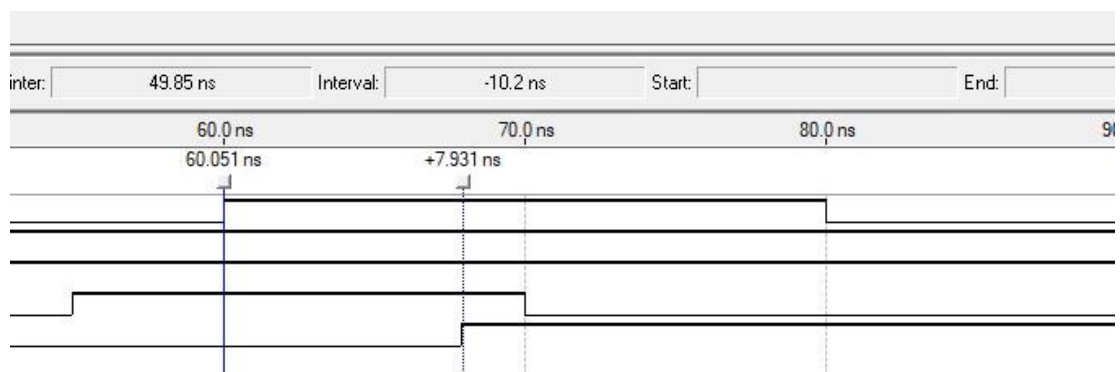
Waveform

Part 2

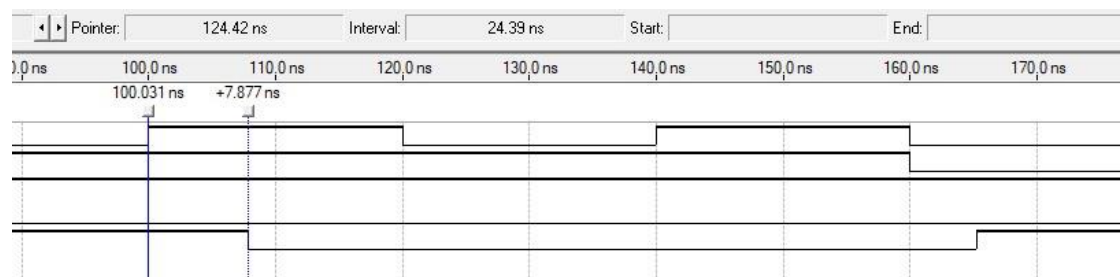
Question 1



Ασύγχρονη καθυστέρηση



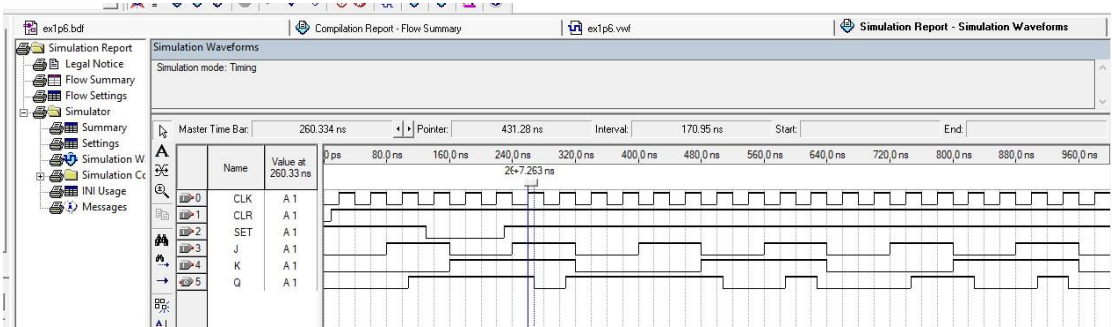
DFF delay



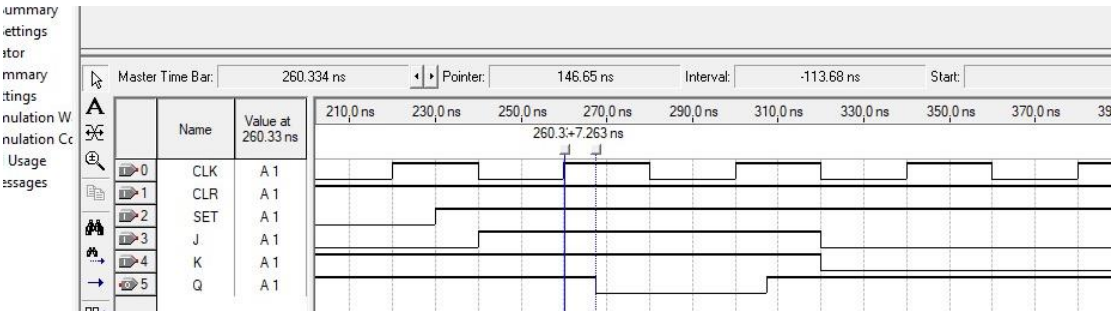
Delay 0

Question 2

JK



JK waveform



JK delay 0

Classic Timing Analyzer Tool

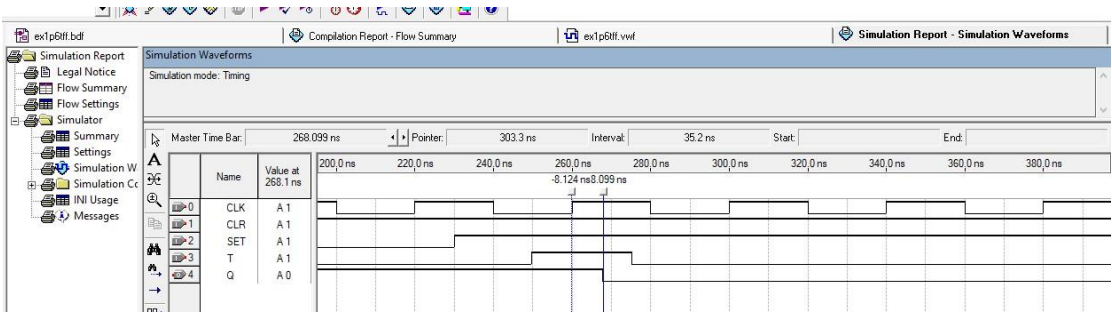
Simulation Report - Simulation Waveforms

Registered Performance | tpd | tsu | tco | th | Custom Delays

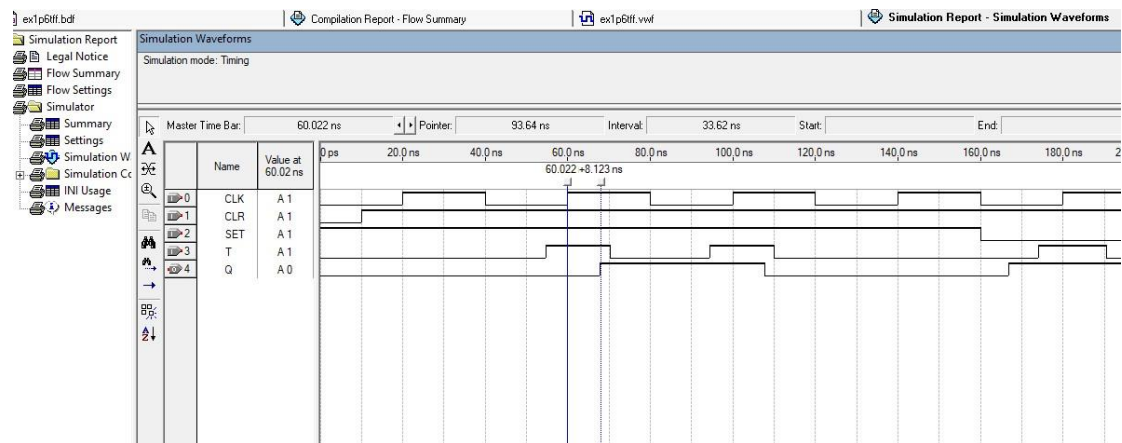
| | Slack | Required P2P Time | Actual P2P Time | From | To |
|---|-------|-------------------|-----------------|------|----|
| 1 | N/A | None | 8.433 ns | SET | Q |
| 2 | N/A | None | 6.584 ns | CLR | Q |

JK time

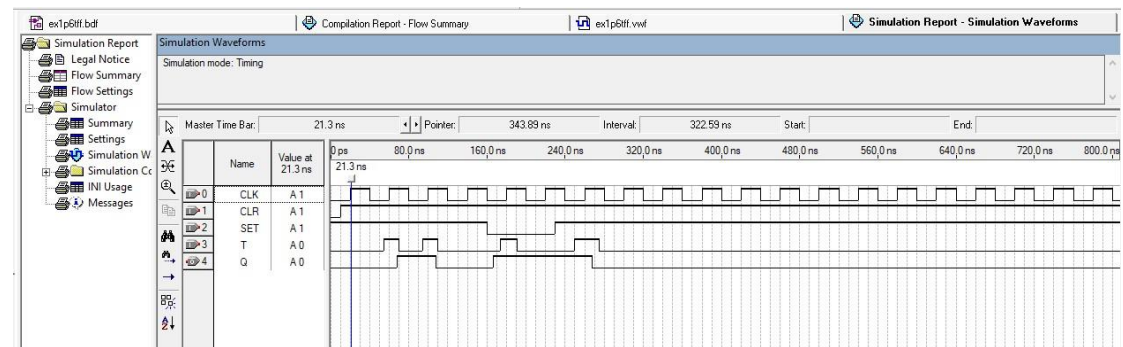
TFF



TFF 0 delay



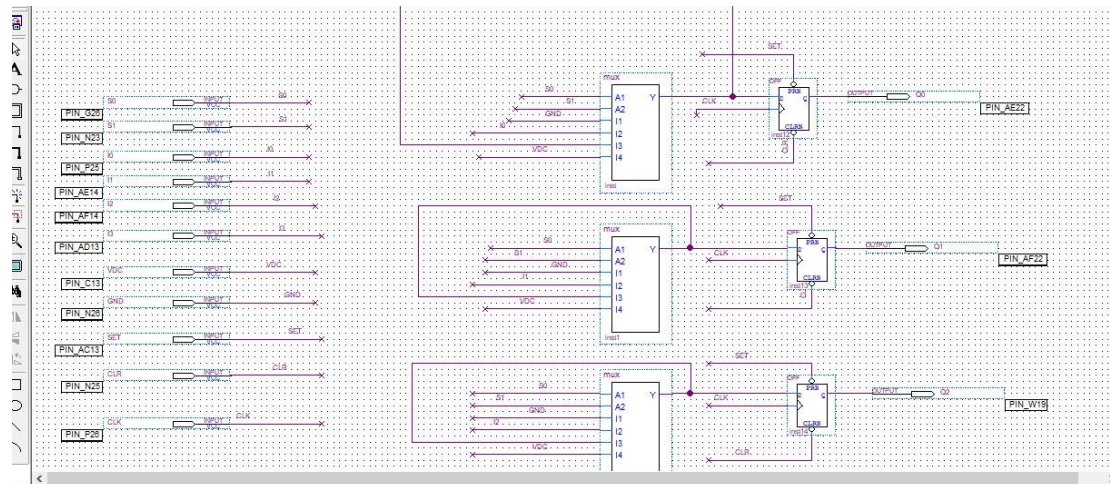
TFF 1 delay



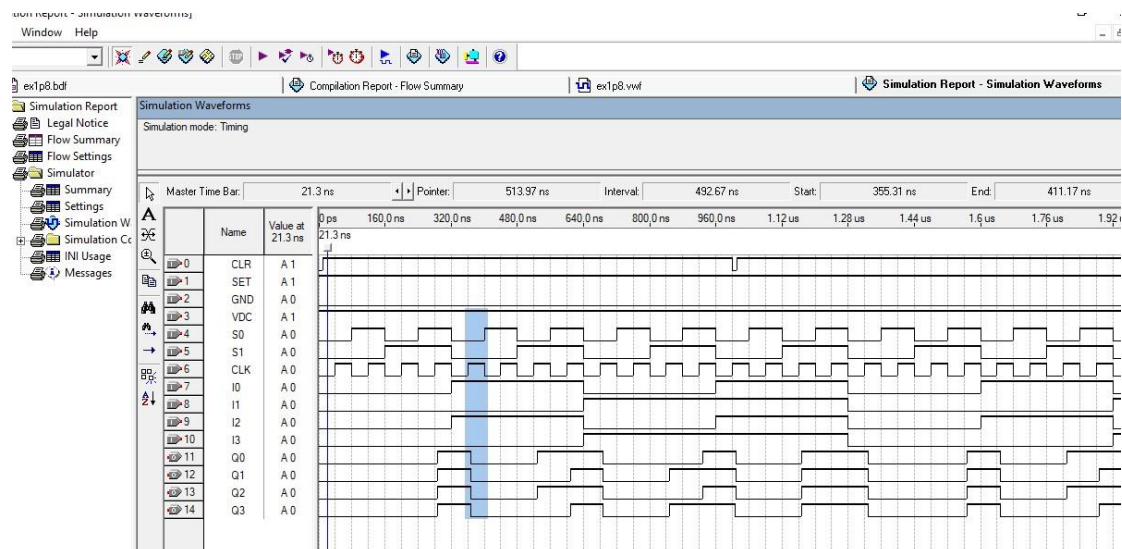
TFF waveform

Question 3

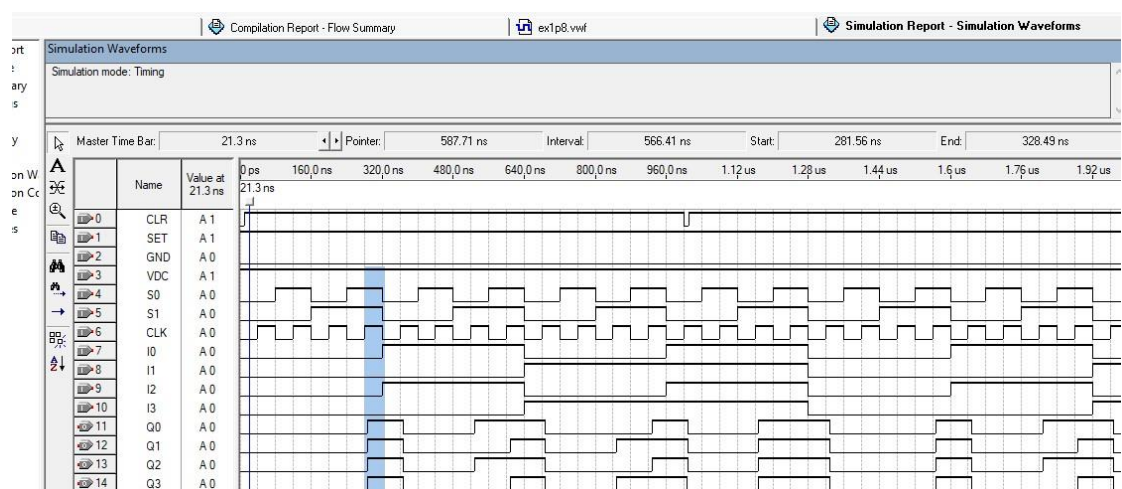
Έγινε δημιουργία του mux από το προηγούμενο ερώτημα και προστέθηκε σαν σχήμα από βιβλιοθήκη



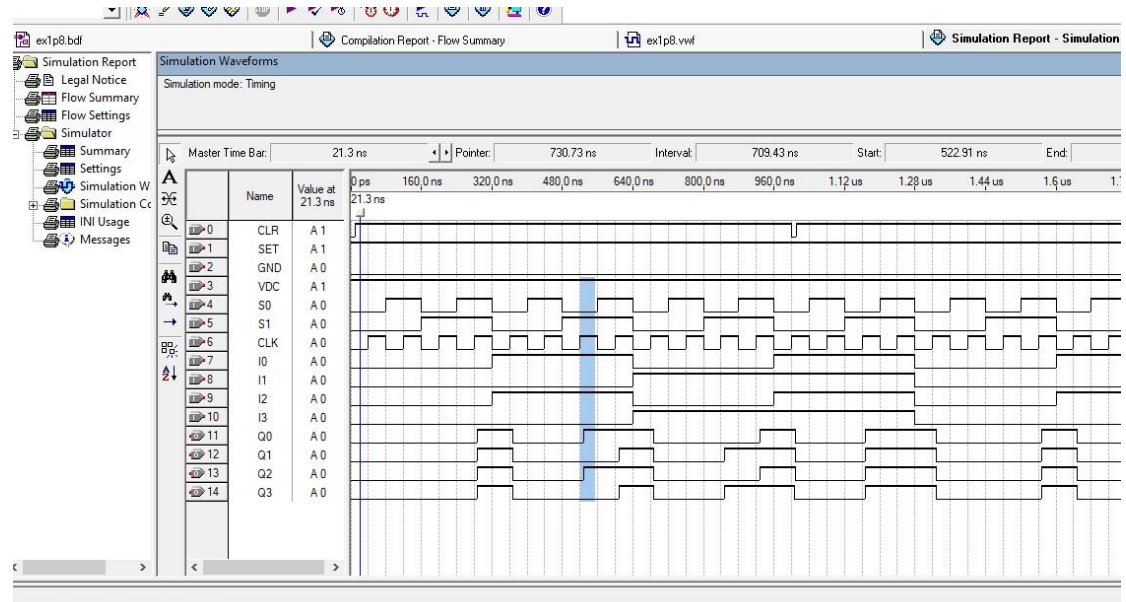
Μέρος του σχηματικού



Register output 0

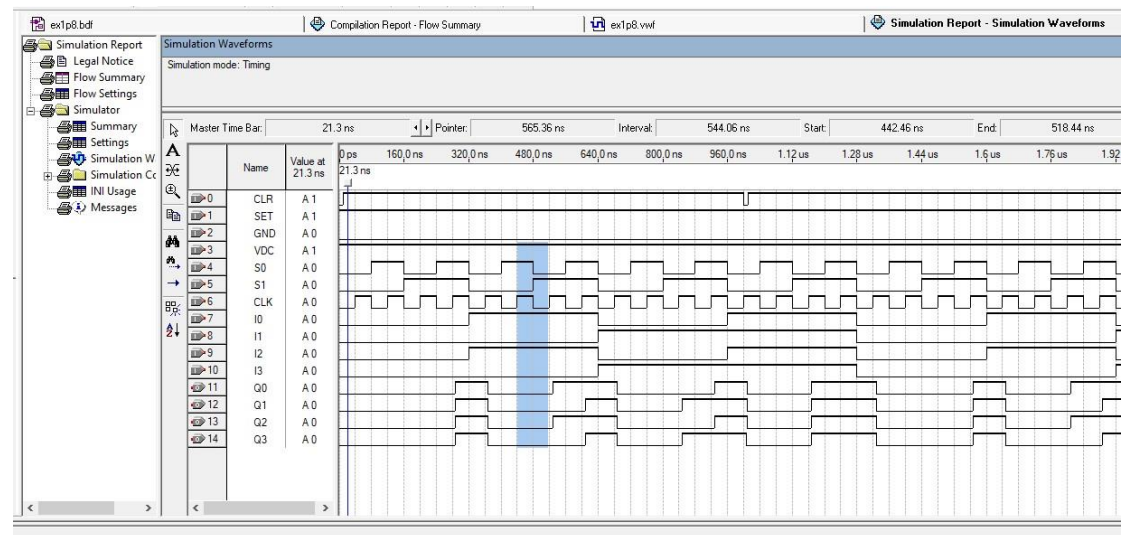


Register output 1



era/9lsp2/quartus/exlp8/exlp8.vwf*

Register output I0..3



Register output store

Παρασκευή Μέγα 2483

Κωνσταντίνα Μυλωνά 2499