Name: Id#

COE 202, Term 162

Fundamentals of Computer Engineering

Quiz# 5 Solution

Date: Tuesday, May 16

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**Q1.** Consider the following sequential circuit:



1. Provide a state table for the given circuit showing the Present State, the input **X**, the Next State, and the output **Z**.



|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| *QA* | *QB* | *X* | *QA+* | *QB+* | *Z* |
| 0 | 0 | 0 | 0 | 1 | 0 |
| 0 | 0 | 1 | 1 | 1 | 0 |
| 0 | 1 | 0 | 1 | 0 | 1 |
| 0 | 1 | 1 | 0 | 0 | 1 |
| 1 | 0 | 0 | 1 | 0 | 1 |
| 1 | 0 | 1 | 0 | 0 | 1 |
| 1 | 1 | 0 | 0 | 0 | 1 |
| 1 | 1 | 1 | 1 | 0 | 1 |

1. Is the circuit type Mealy or Moore? Justify your answer.

Moore since Z = Π*M*(0,1) = (*QA* + *QB* +*X*)(*QA* + *QB* + *X* **’**) = *QA* + *QB* which is a function of the present states only. This is also clear from the state table obtained in part (a).

**Q2.** Consider the following state table. Assume that the initial state of the circuit implementation of the given state table is (*QAQB* = 10). Draw the waveforms of *QA*, *QB*, and *Z* for the given 2 clock cycles in response to the shown applied input *X*. ***Ignore propagation delays, setup times, and hold times. Assume that the circuit uses rising edge-triggered D-FF(s)***.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Present State | | *X* | Next State | | *Z* |
| *QA* | *QB* | *DA* | *DB* |
| 0 | 0 | 0 | 0 | 1 | 1 |
| 0 | 0 | 1 | 1 | 1 | 0 |
| 0 | 1 | 0 | 1 | 0 | 0 |
| 0 | 1 | 1 | 0 | 0 | 0 |
| 1 | 0 | 0 | 1 | 0 | 0 |
| 1 | 0 | 1 | 0 | 0 | 1 |
| 1 | 1 | 0 | 0 | 0 | 1 |
| 1 | 1 | 1 | 1 | 0 | 1 |

