PRACTICAL 4A: SEQUENTIAL CIRCUITSRonak Mehta (MHTRON001)

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15-05-2018  
Signature Date

Solutions

PART 1:

(a)

The system has 4 states namely 2, 4, 6 and 8.

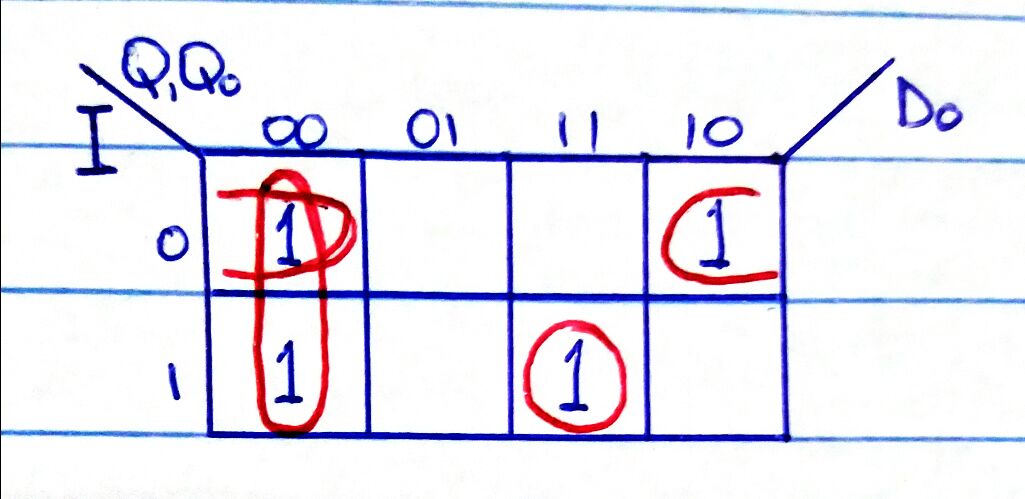
Number of bits == (log24 = 2) == Number of D-Flip Flops in the system

|  |  |
| --- | --- |
| States | State Number |
| 2 | 00 |
| 4 | 01 |
| 6 | 10 |
| 8 | 11 |

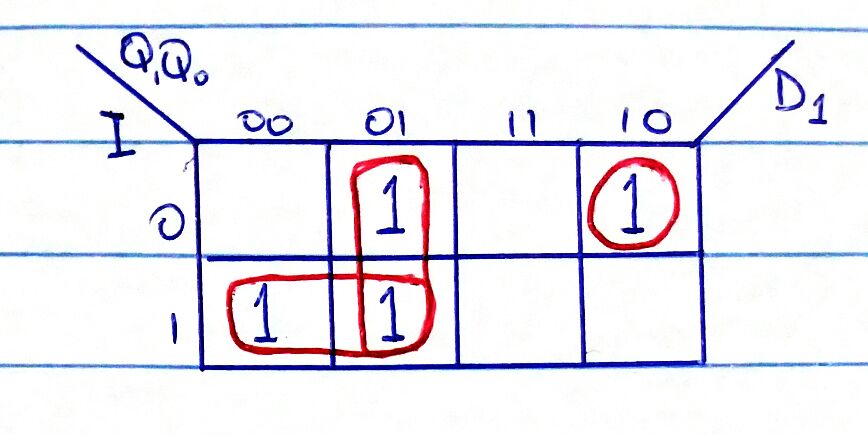
Present State/Next State Diagram

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| INPUT | PRESENT STATE | | NEXT STATE | |
| I | Q1 | Q0 | D1 | D0 |
| 0 | 0 | 0 | 0 | 1 |
| 0 | 0 | 1 | 1 | 0 |
| 0 | 1 | 0 | 1 | 1 |
| 0 | 1 | 1 | 0 | 0 |
| 1 | 0 | 0 | 1 | 1 |
| 1 | 0 | 1 | 1 | 0 |
| 1 | 1 | 0 | 0 | 0 |
| 1 | 1 | 1 | 0 | 1 |

(b) Equations from Karnaugh Maps



D0 = ( . ) + () + (I . Q1 . Q0)



D1 = ( . Q0) + (I . ) + ()

Table for Output Logic expression

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **PRESENT STATE** | | **OUTPUTS** | | | |
| **Q1** | **Q0** | **O3** | **O2** | **O1** | **O0** |
| 0 | 0 | 0 | 0 | 1 | 0 |
| 0 | 1 | 0 | 1 | 0 | 0 |
| 1 | 0 | 0 | 1 | 1 | 0 |
| 1 | 1 | 1 | 0 | 0 | 0 |

Expressions for the Output

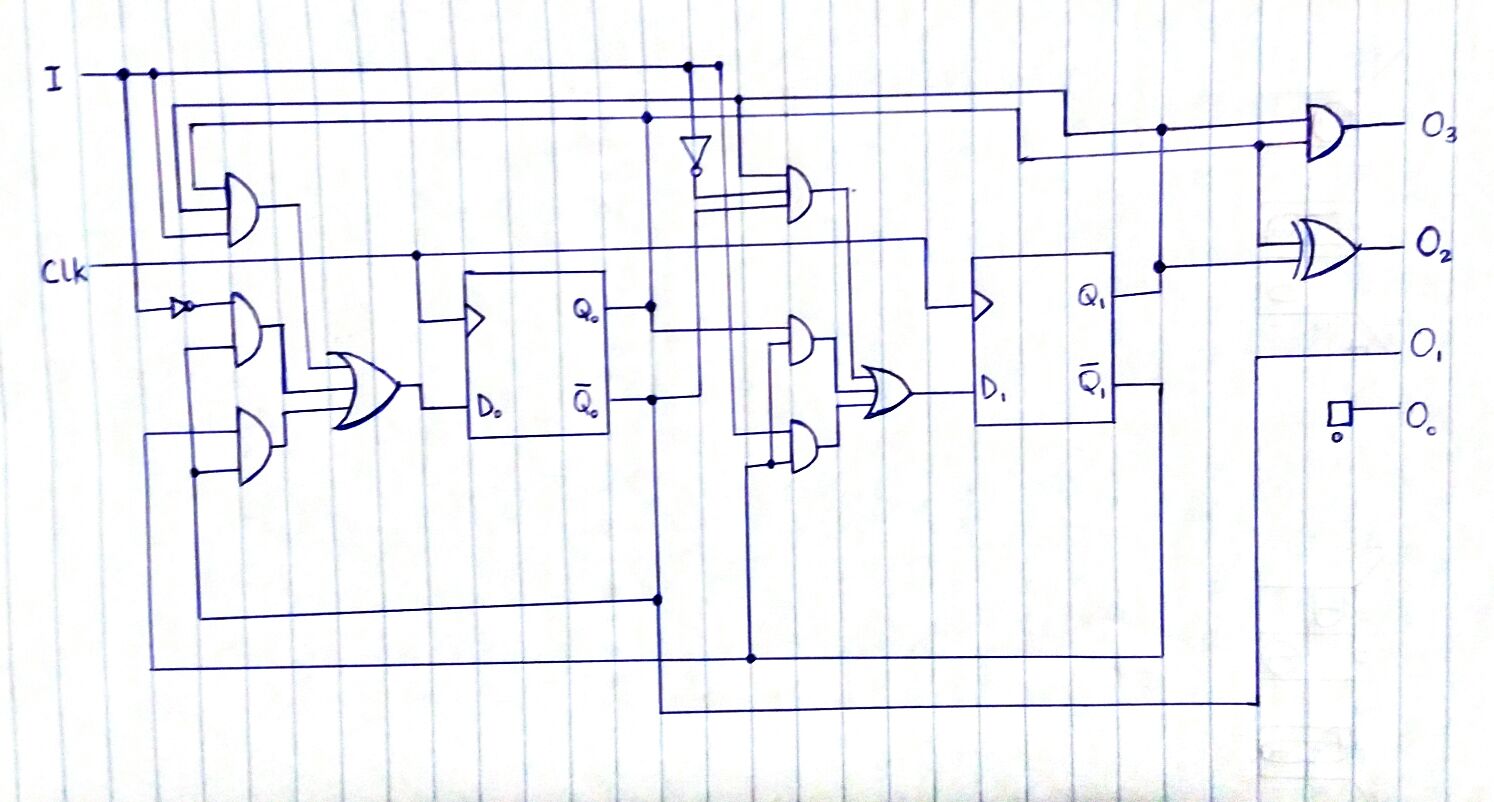
O3 = Q1 . Q0

O2 = Q1 ⊕ Q0

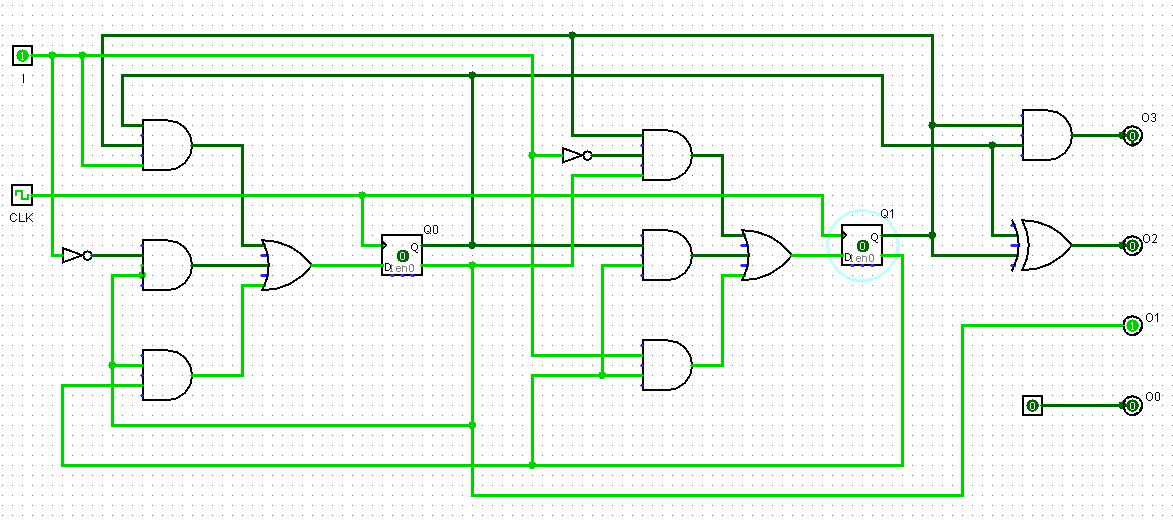
O1 =

O0 = 0

(c)

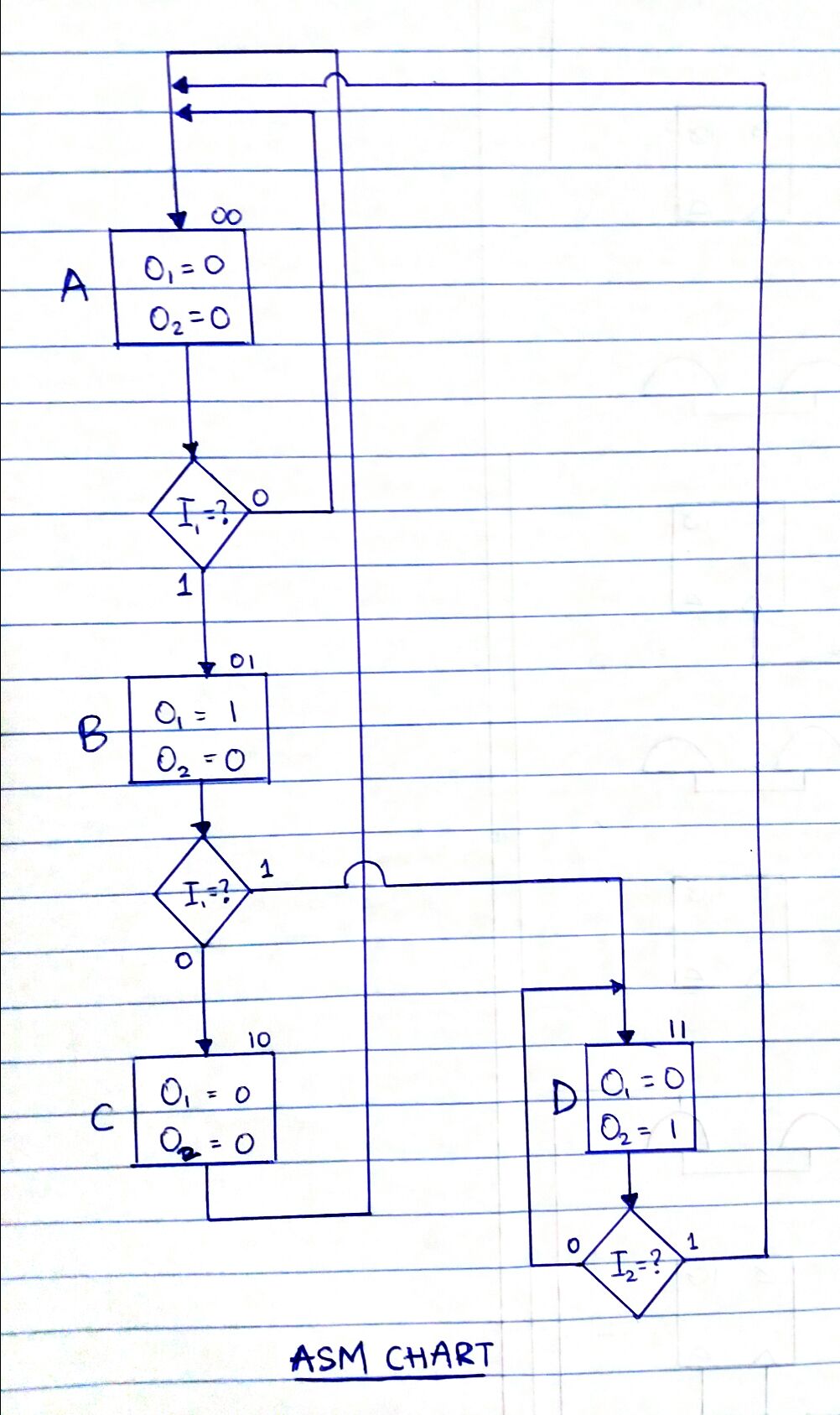


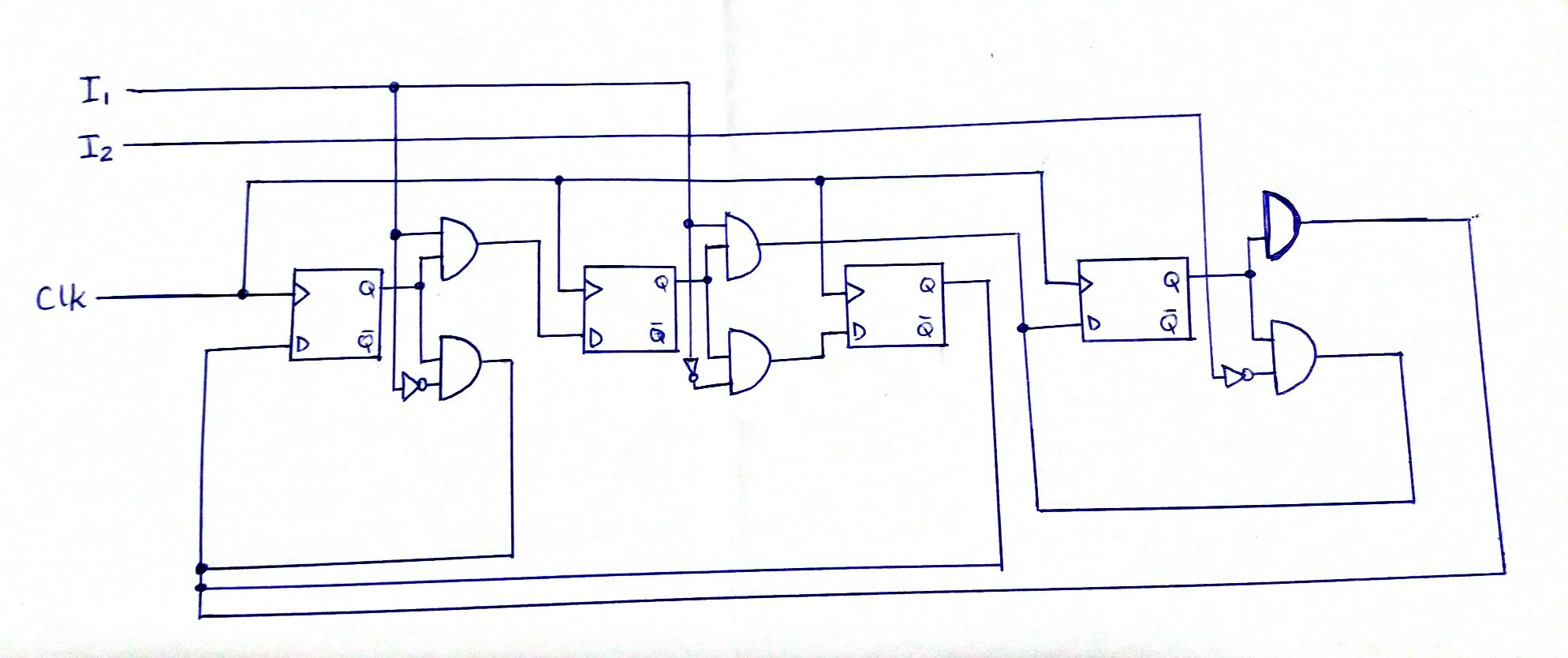
d) Screenshot of Circuit diagram from Logisim



**PART 2:**

(a)



(b)

(c) Screenshot of circuit diagram from Logisim

