PRACTICAL 4A: SEQUENTIAL CIRCUITS

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3. This practical report (including circuit diagrams and code) is my own work.
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5. I acknowledge that copying someone else's code, schematics or report, or part of it, is wrong, and declare that this is my own work.

Signature

15-05-2018

Date

Solutions

PART 1:

(a)

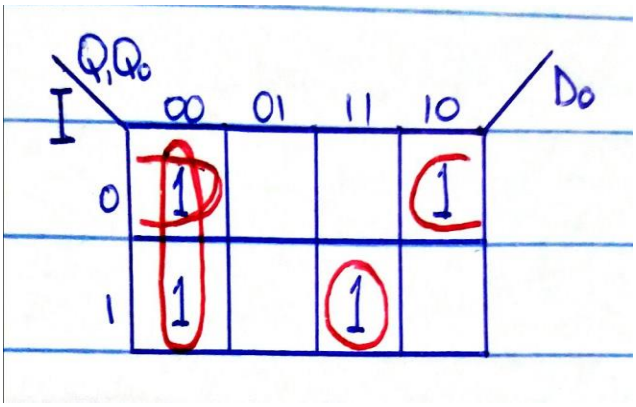
The system has 4 states namely 2, 4, 6 and 8.
Number of bits == ($\log_2 4$ = **2**) == Number of D-Flip Flops in the system

States	State Number
2	00
4	01
6	10
8	11

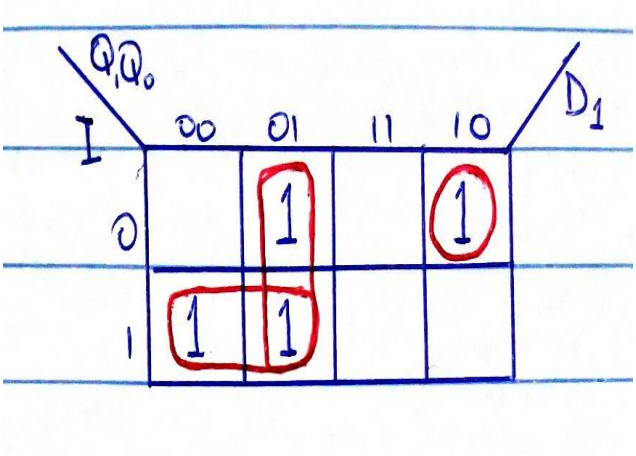
Present State/Next State Diagram

INPUT	PRESENT STATE		NEXT STATE	
I	Q_1	Q_0	D_1	D_0
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



$D_0 = (\overline{Q1} \cdot \overline{Q0}) + (\overline{I} \cdot \overline{Q0}) + (I \cdot Q1 \cdot Q0)$



$D_1 = (\overline{Q1} \cdot Q0) + (I \cdot \overline{Q1}) + (\overline{I} \cdot Q1 \cdot \overline{Q0})$

Table for Output Logic expression

PRESENT STATE		**OUTPUTS**			
Q_1	**Q_0**	**O_3**	**O_2**	**O_1**	**O_0**
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

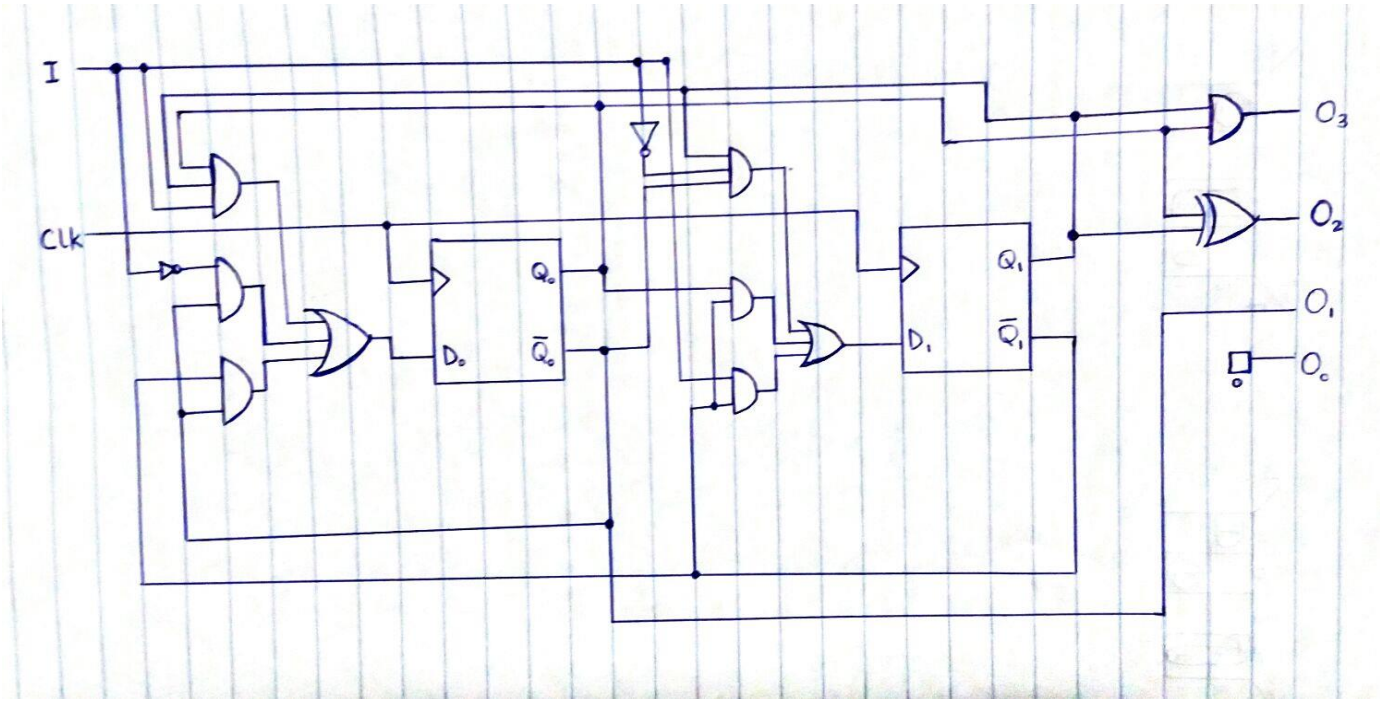
$O_3 = Q_1 \cdot Q_0$

$O_2 = Q_1 \oplus Q_0$

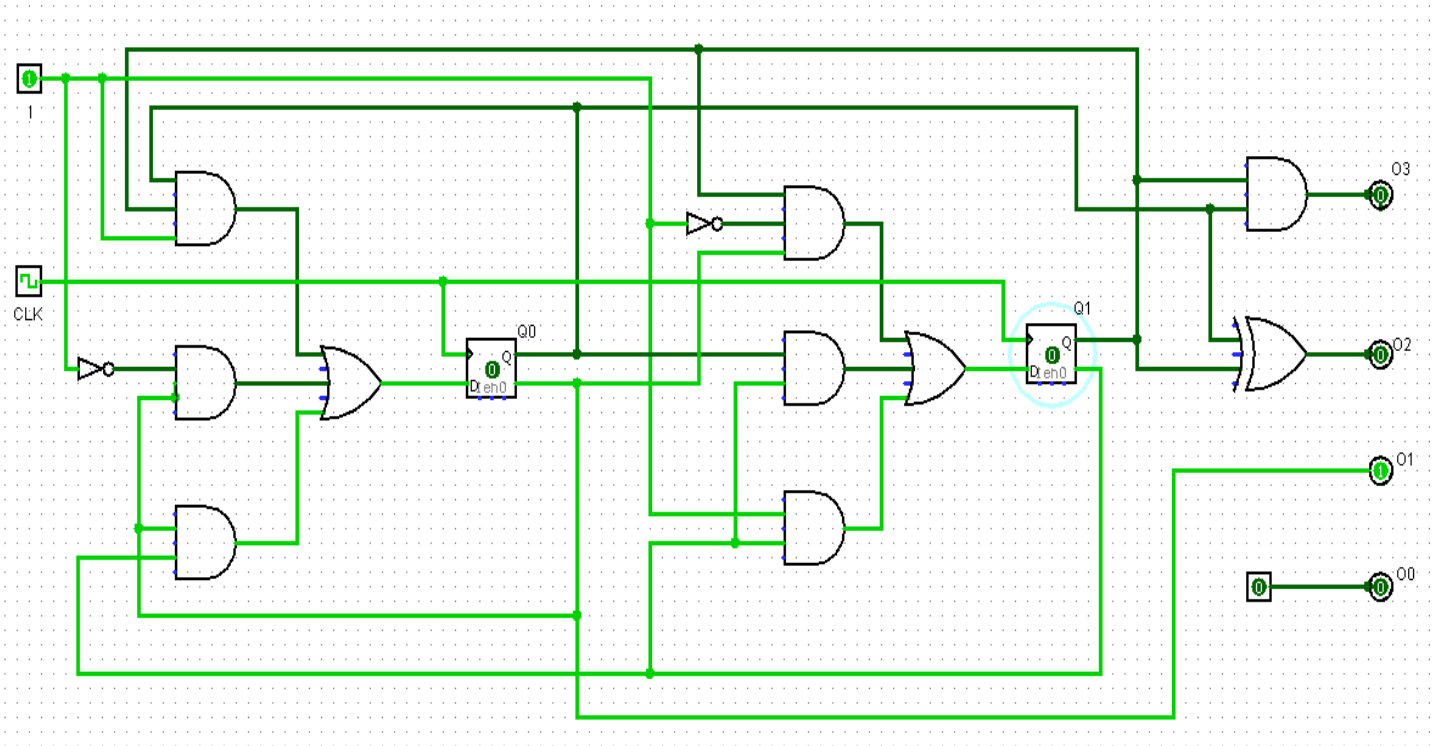
$O_1 = \overline{Q0}$

$O_0 = 0$

(c)

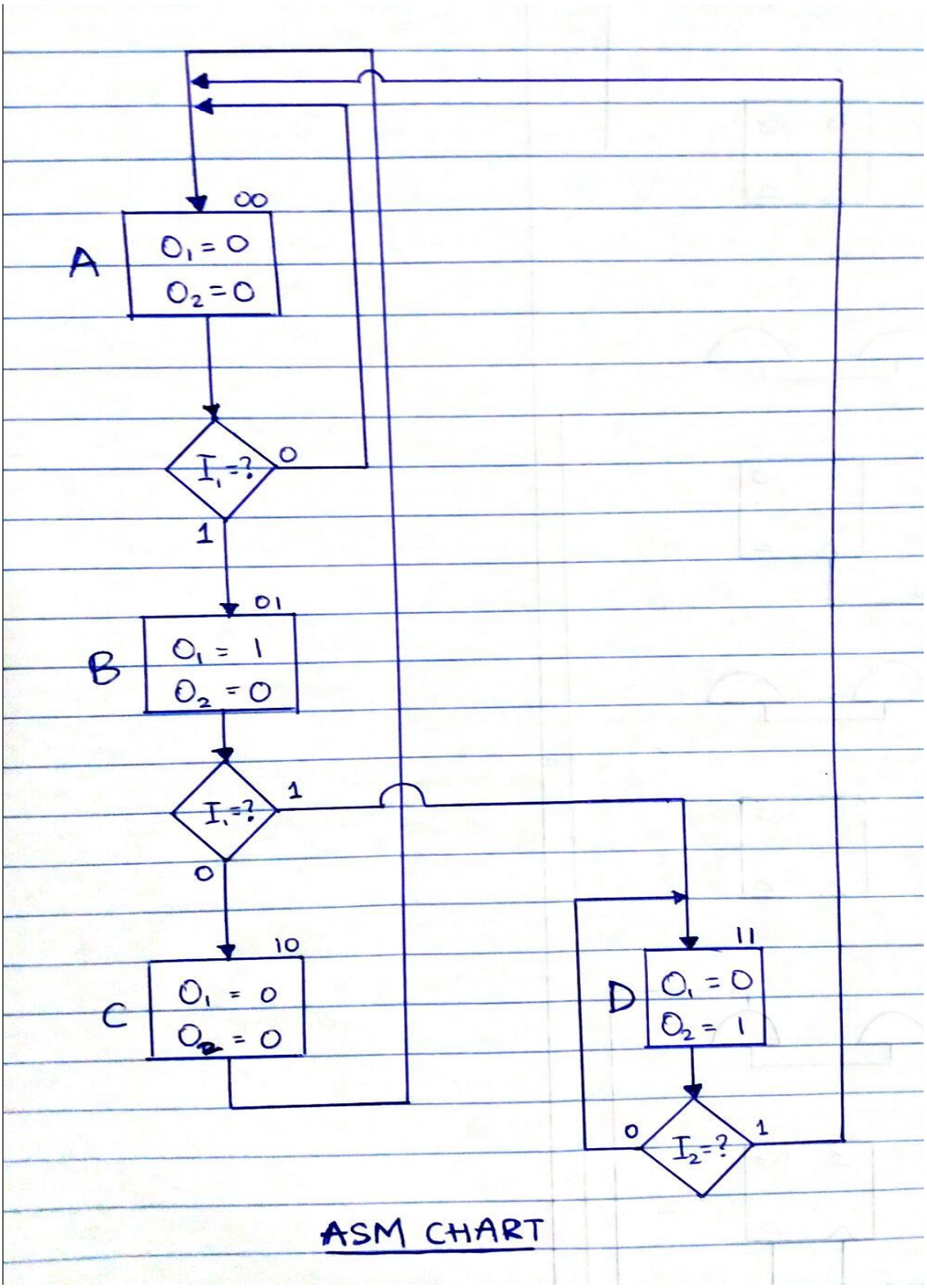


d) Screenshot of Circuit diagram from Logisim

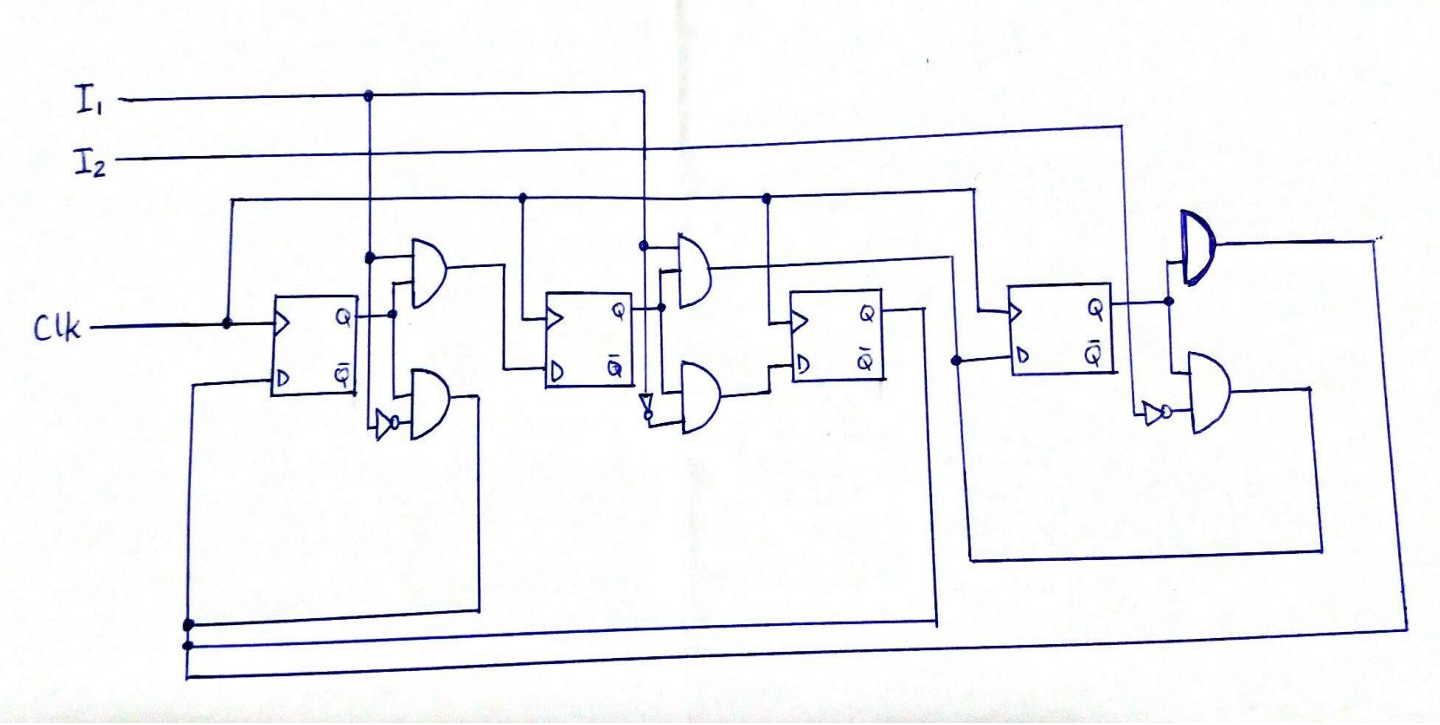


PART 2:

(a)


00
A
$O_1 = 0$
$O_2 = 0$
$I_1 = ?$
0
1
01
B
$O_1 = 1$
$O_2 = 0$
$I_1 = ?$
1
0
10
C
$O_1 = 0$
$O_2 = 0$
11
D
$O_1 = 0$
$O_2 = 1$
0
$I_2 = ?$
1
ASM CHART

(b)



(c) Screenshot of circuit diagram from Logisim