

EE2000 Test 2

Name: _____ Student ID: _____ Seat No: _____

Answers

Q1. Reduce the state table with (i) partition method, and (ii) implication table method.

State	Next State		Output Y
	X=0	X=1	
A	B	C	1
B	D	F	1
C	F	E	0
D	B	G	1
E	F	C	0
F	E	D	0
G	F	G	0

B	BD CF					
C						
D	CG	EG				
E			✓			
F			EF DE	CD		
G		EG		CG	EF DG	
	A	B	C	D	E	F

[14 marks]

$$C=E$$

$$A=D \Rightarrow C=G$$

$$(C=G \Rightarrow E=G) \ \& \ (E=G \Rightarrow C=G) \Rightarrow C=E=G$$

$$\therefore A=D, \text{ and } C=E=G$$

[3 marks]

PS	NS		O/P
	X=0	X=1	Y
A	B	C	1
B	D	F	1
C	F	E	0
D	B	G	1
E	F	C	0
F	E	D	0
G	F	G	0

PS	NS		O/P
	X=0	X=1	Y
A	B	C	1
B	A	F	1
C	F	C	0
F	C	A	0

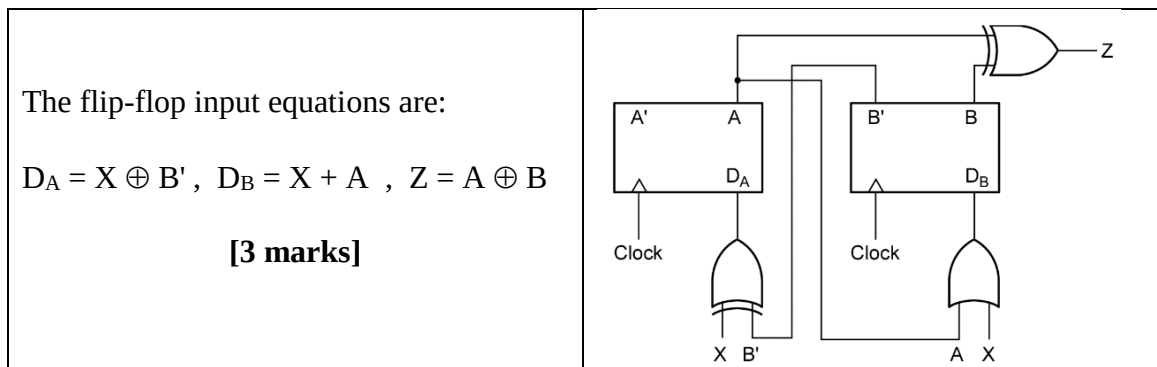
Reduced state table

[2 marks]

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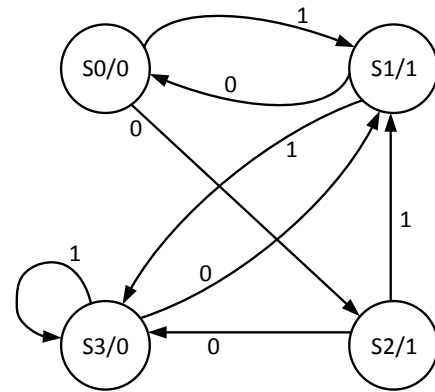
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- Q2. Fine the state diagram and next state equations for the following circuit. Use $S_0=00$, $S_1=01$, $S_2=10$, and so on for binary state assignment.



PS	Input	FFs' excitation		NS	O/P
AB	X	D_A	D_B	AB	Z
00	0	1	0	10	0
00	1	0	1	01	0
01	0	0	0	00	1
01	1	1	1	11	1
10	0	1	1	11	1
10	1	0	1	01	1
11	0	0	1	01	0
11	1	1	1	11	0

[12 marks]



[4 marks]

State equations:

$$A(t+1) = X'B(t)' + X B(t) = X \oplus B(t), \quad B(t+1) = X + A$$

[6 marks]

	AB			
X	00	01	11	10
0	1			1
1		1	1	

	AB			
X	00	01	11	10
0			1	1
1	1	1	1	1

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- Q3. A 2-bit counter will generate modulo-2 output for an input $s = 0$, and generate modulo-3 output for $s = 1$. Use JK FFs to design the circuit and draw the circuit.

Output = NS

PS	I/P	NS	FF inputs	
Q_1Q_0	s	Q_1Q_0	J_1K_1	J_0K_0
00	0	00	0x	0x
00	1	00	0x	0x
01	0	01	0x	x0
01	1	01	0x	x0
10	0	00	x1	0x
10	1	10	x0	0x
11	0	01	x1	x0
11	1	00	x1	x1

[12 marks]

Q_1Q_0			
s			
		X	X
		X	X

$J_1 = 0$

Q_1Q_0			
s			
	X	X	1
	X	X	1

$K_1 = s' + Q_0$

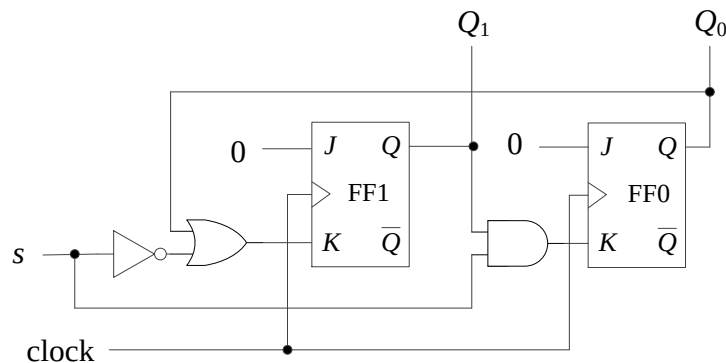
Q_1Q_0			
s			
	X	X	
	X	X	

$J_0 = 0$

Q_1Q_0			
s			
	X		X
	X	1	X

$K_0 = sQ_1$

[8 marks]



[4 marks]

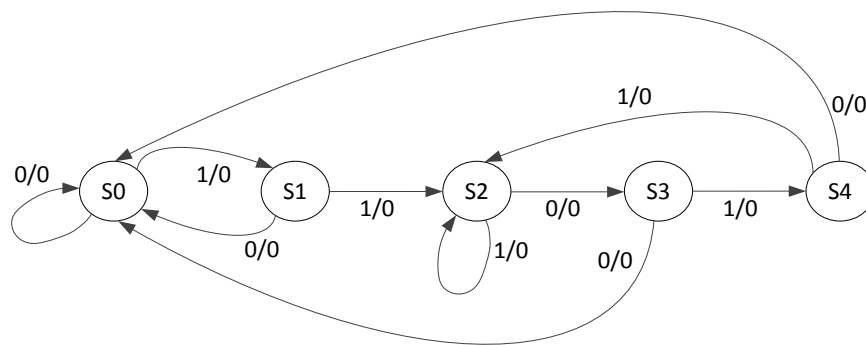
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- Q4. Draw a state diagram for a sequential circuit to produce an output of 1 if the serial binary input to this circuit contains a pattern of 11011. An example is shown below:

Input: 101101101100110110

Output: 000000100100000010



[12 marks]