Heimadæmi05 Greining og Hönnun stýrikerfa TÖV201G

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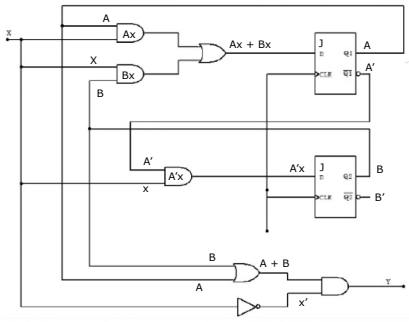
5. A0 Útfærðu fyrir rásina hér að neðan:
(1) Stöðujöfnur
(2) Stöðutöflu
(3) Stöðurit



a) Stöðujöfnur

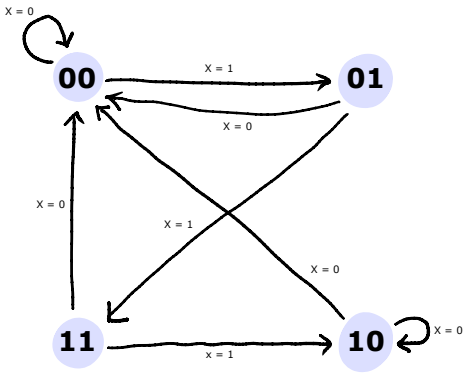
JA = Ax + Bx
JB = A'x
Y = A+B(x')

b) Stöðutafla

Present State					Next State		Output
A	A'	B	x	x'	A+	B+	Y
0	1	0	0	1	0	0	0
0	1	0	1	0	0	1	0
0	1	1	0	1	0	0	1
0	1	1	1	0	1	1	0
1	0	0	0	1	0	0	1
1	0	0	1	0	1	0	0
1	0	1	0	1	0	0	1
1	0	1	1	0	1	0	0

J	K	Q+
0	0	No Change
0	1	Reset/ Q = 0
1	0	Set/ Q = 1
1	1	Toggle/ Q = Flip

c) Stöðurit



5.5 Explain the Diffrences

Explain the difrennces among a **truth table, a state table, characteristic table, and an excitation table. Also, explain the diffrence among a Boolean Equation, a state equation, a characteristic equation, and a flip-flop input equation.**

Lausn 5.5

- **Truth table**
  - A truth table is a mathematical table used to represent the logical relationships between two or more boolean variables. It lists all possible input combinations and the corresponding outputs of a logic circuit. In other words, a truth table provides a systematic way to define the behavior of a logical circuit.
- **State table**
  - A state table is a tabular representation of the sequential behavior of a digital circuit. It describes the sequence of states that a circuit can be in and the input conditions that cause it to transition from one state to another. State tables are commonly used in the design of sequential circuits like flip-flops and registers.
- **Characteristic table**
  - A characteristic table is a table that shows the behavior of a logic circuit in terms of its characteristic equations. It provides a concise representation of the circuit's behavior and can be used to simplify the design of logic circuits.
- **Excitation table**
  - An excitation table is a table that describes the input conditions required to transition from one state to another in a sequential circuit. It is used in the design of sequential circuits like flip-flops and registers.
- **Boolean Equation**
  - A Boolean equation is a mathematical expression used to represent the behavior of a logic circuit. It uses Boolean algebra to describe the logic function of the circuit in terms of its input and output variables.
- **State equation**
  - A state equation is a mathematical expression used to represent the sequential behavior of a digital circuit. It describes the sequence of states that a circuit can be in and the input conditions that cause it to transition from one state to another.
- **Characteristic equation**
  - A characteristic equation is a mathematical expression used to represent the behavior of a logic circuit in terms of its characteristic function. It provides a concise representation of the circuit's behavior and can be used to simplify the design of logic circuits.
- **flip-flop input equation**
  - A flip-flop input equation is a mathematical expression used to describe the input conditions required to transition from one state to another in a flip-flop circuit. It is used in the design of sequential circuits like flip-flops and registers.

5.10

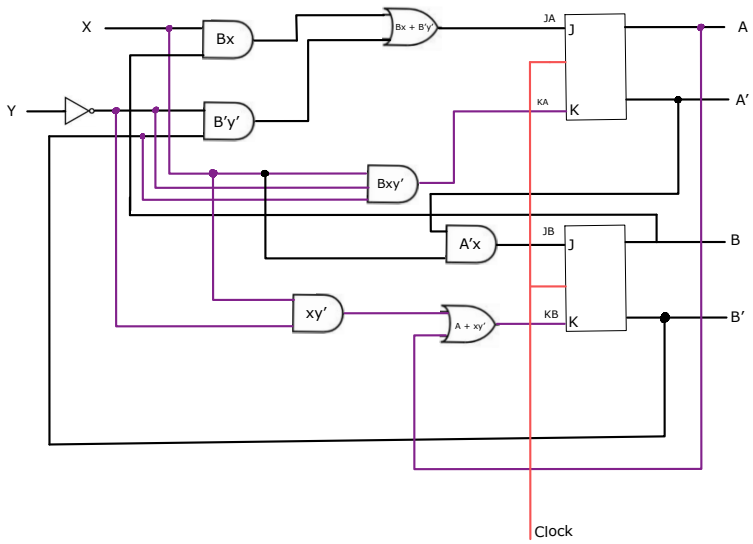
5.10 A sequential circuit has two *JK* flip-flops *A* and *B*, two inputs *x* and *y*, and one output *z*. The flip-flop input equations and circuit output equation are

$$J_A = Bx + B'y' \qquad K_A = B'xy'$$
$$J_B = A'x \qquad K_B = A + xy'$$
$$z = Ax'y' + Bx'y'$$

- **(a) Draw a the logic diagram of the circuit**
- **(b) Tabulate the state table**
- **(c) Derive the state equation for *A* and *B***

Lausn 5.10

a) Logic diagram of the Circuit



b) State Table

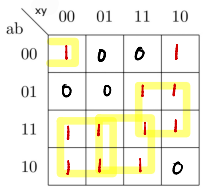
Present State		Inputs		Next State		Output Z = Ax'y' + Bx'+y'	Flip-Flop Units			
A	B	x	y	A+	B+	z	J_A	K_A	J_B	K_B
0	0	0	0	1	0	0	1	0	0	0
0	0	0	1	0	0	0	0	0	0	0
0	0	1	0	1	1	0	1	1	1	1
0	0	1	1	0	1	0	0	0	1	0
0	1	0	0	0	1	1	0	0	0	0
0	1	0	1	0	1	0	0	0	0	0
0	1	1	0	1	0	0	1	0	1	1
0	1	1	1	1	1	0	1	0	1	0
1	0	0	0	1	0	1	1	0	0	1
1	0	0	1	1	0	0	0	0	0	1
1	0	1	0	0	0	0	1	1	0	1
1	0	1	1	1	0	0	0	0	0	1
1	1	0	0	1	0	1	0	0	0	1
1	1	0	1	1	0	0	0	0	0	1
1	1	1	0	1	0	0	1	0	0	1
1	1	1	1	1	0	0	1	0	0	1

A B

J	K	Q+
0	0	No Change
0	1	Reset/ Q = 0
1	0	Set/ Q = 1
1	1	Toggle/ Q = Flip

Skoða þessa töflu til að fá A+ og B+
Hvað gerist þegar A/Present state er í 0?
Skoða flip-flop inputs.

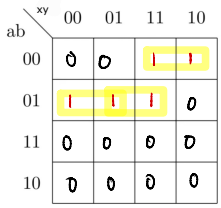
c) Derive the state equation for **A** and **B**



Group

(0,2) = A'B'y'
(7,6,15,14) = Ay
(13,15,9,11) = Ax'

A(t+1) = Ax' + Bx + Ay + A'B'y'



Group

(2,3) = A'B'
(4,5) = A'Bx'
(5,7) = A'By

B(t+1) = A'B'x + A'Bx' + A'By

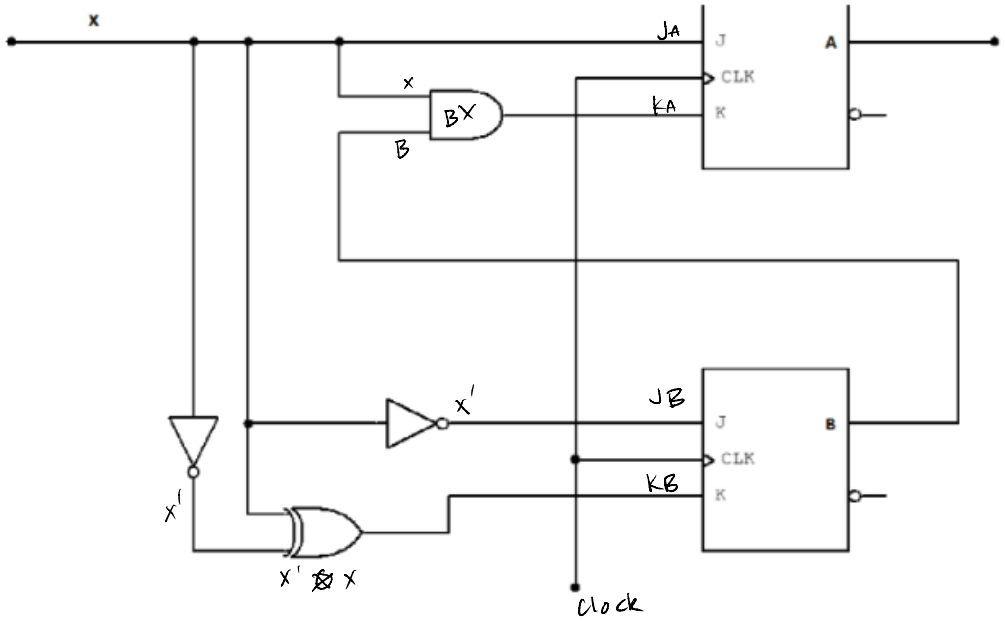
5.A1

5. A1 Útfærðu fyrir rásina hér að neðan:

(1) Stöðujöfnur

(2) Stöðutöflu

(3) Stöðurit



a) Stöðujöfnur

JA = x
JB = x'
KA = Bx
KB = x ⊕ x'

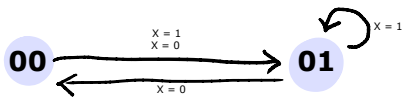
b) Stöðutafla

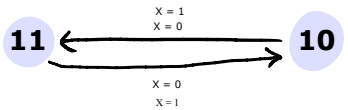
Present State		Inputs	Next State		Flip-Flop Units			
A	B	x	A+	B+	J_A	K_A	J_B	K_B
0	0	0	0	1	0	0	1	1
0	0	1	0	1	0	0	0	1
0	1	0	0	0	0	0	1	1
0	1	1	0	1	0	1	0	1
1	0	0	1	1	1	0	1	1
1	0	1	1	1	1	0	0	1
1	1	0	1	0	1	0	1	1
1	1	1	0	1	1	1	0	1

J	K	Q+
0	0	No Change
0	1	Reset/ Q = 0
1	0	Set/ Q = 1
1	1	Toggle/ Q = Flip

XOR = ef það myndar Oddatölu
0 = slétt
1 = odda

c) Stöðurit





Í stöðurit skoðum við Present State A og B til að fá fyrir next state.

AB = 00 -> A+B+ = 01 Þegar x er 0