

## Lab 6 - Sequential Project 2

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Truth table

Current State			Input		Next State			T	JK		D	Out
X	Y	Z	A	B	X*	Y*	Z*	T <sub>x</sub>	J <sub>y</sub>	K <sub>y</sub>	D <sub>z</sub>	O
0	0	0	0	0	0	0	1	0	0	X	1	0
0	0	0	0	1	0	0	0	0	0	X	0	0
0	0	0	1	0	0	1	0	0	1	X	0	0
0	0	0	1	1	0	0	0	0	0	X	0	0
0	0	1	0	0	0	1	0	0	1	X	0	0
0	0	1	0	1	0	0	0	0	0	X	0	0
0	0	1	1	0	0	1	1	0	1	X	1	0
0	0	1	1	1	0	0	0	0	0	X	0	0
0	1	0	0	0	0	1	1	0	X	0	1	0
0	1	0	0	1	0	0	0	0	X	1	0	0
0	1	0	1	0	1	0	0	1	X	1	0	0
0	1	0	1	1	0	0	0	0	X	1	0	0
0	1	1	0	0	1	0	0	1	X	1	0	0
0	1	1	0	1	0	0	0	0	X	1	0	0
0	1	1	1	0	1	0	1	1	X	1	1	0
0	1	1	1	1	0	0	0	0	X	1	0	0
1	0	0	0	0	1	0	1	0	0	X	1	0
1	0	0	0	1	0	0	0	1	0	X	0	0
1	0	0	1	0	0	0	0	1	0	X	0	0
1	0	0	1	1	0	0	0	1	0	X	0	0
1	0	1	0	0	0	0	0	1	0	X	0	1
1	0	1	0	1	0	0	0	1	0	X	0	0
1	0	1	1	0	0	0	1	1	0	X	1	1
1	0	1	1	1	0	0	0	1	0	X	0	0

Functions

·) T<sub>x</sub>

		$\bar{X}$				X					
		AB		$\bar{A}$		A		$\bar{B}$		B	
$\bar{Y}$	00	0	1	3	2	4	5	7	6	8	9
	01	1	5	7	6	8	9	11	10	12	13
Y	11	1	13	15	14	16	15	17	16	18	17
	10	1	13	15	14	16	15	17	16	18	17

		$\bar{X}$				X					
		AB		$\bar{A}$		A		$\bar{B}$		B	
$\bar{Y}$	00	1	1	1	1	1	1	1	1	1	1
	01	1	1	1	1	1	1	1	1	1	1
Y	11	1	1	1	1	1	1	1	1	1	1
	10	1	1	1	1	1	1	1	1	1	1

$$T_x = XA + XB + XZ + Y\bar{A}\bar{B} + YZ\bar{B}$$

$$= X(A+B+Z) + Y\bar{B}(A+Z)$$

.)  $J_y$

		$\bar{X}$				
yz	AB	$\bar{A}$	A			
	00	01	11	10		
y	00	0	1	3	2	$\bar{z}$
	01	4	5	7	6	$\bar{z}$
$\bar{y}$	11	12	13	15	14	$z$
	10	8	9	11	10	$z$
		$\bar{B}$	B	$\bar{B}$		

		X				
yz	AB	$\bar{A}$	A			
	00	01	11	10		
$\bar{y}$	00	16	17	19	18	$\bar{z}$
	01	20	21	23	22	$\bar{z}$
y	11	28	29	31	30	$z$
	10	24	25	27	26	$z$
		$\bar{B}$	B	$\bar{B}$		

$$J_x = \bar{X}A\bar{B} + \bar{X}z\bar{B}$$

$$= \bar{X}\bar{B}(A+z)$$

.)  $K_y$

		$\bar{X}$				
yz	AB	$\bar{A}$	A			
	00	01	11	10		
y	00	X	X	X	X	$\bar{z}$
	01	X	X	X	X	$\bar{z}$
$\bar{y}$	11	1	1	1	1	$z$
	10	8	9	11	10	$z$
		$\bar{B}$	B	$\bar{B}$		

		X				
yz	AB	$\bar{A}$	A			
	00	01	11	10		
$\bar{y}$	00	X	X	X	X	$\bar{z}$
	01	X	X	X	X	$\bar{z}$
y	11	X	X	X	X	$z$
	10	X	X	X	X	$z$
		$\bar{B}$	B	$\bar{B}$		

$$K_y = z + A + B$$

.)  $D_z$

		$\bar{X}$				
yz	AB	$\bar{A}$	A			
	00	01	11	10		
y	00	1		3	2	$\bar{z}$
	01	1	5	7	4	$\bar{z}$
$\bar{y}$	11	12	13	15	14	$z$
	10	8	9	11	10	$z$
		$\bar{B}$	B	$\bar{B}$		

		X				
yz	AB	$\bar{A}$	A			
	00	01	11	10		
$\bar{y}$	00	16		19	18	$\bar{z}$
	01	20	21	23	22	$\bar{z}$
y	11	28	29	31	30	$z$
	10	24	25	27	26	$z$
		$\bar{B}$	B	$\bar{B}$		

$$D_z = \bar{z}\bar{A}\bar{B} + zA\bar{B}$$

$$= \bar{B}(\bar{z}\bar{A} + zA)$$

$$= \bar{B} \cdot (z \oplus A)$$

.)  $O$

		$\bar{X}$				
yz	AB	$\bar{A}$	A			
	00	01	11	10		
y	00	0	1	3	2	$\bar{z}$
	01	1	5	7	4	$\bar{z}$
$\bar{y}$	11	12	13	15	14	$z$
	10	8	9	11	10	$z$
		$\bar{B}$	B	$\bar{B}$		

		X				
yz	AB	$\bar{A}$	A			
	00	01	11	10		
$\bar{y}$	00	16		19	18	$\bar{z}$
	01	20	21	23	22	$\bar{z}$
y	11	28	29	31	30	$z$
	10	24	25	27	26	$z$
		$\bar{B}$	B	$\bar{B}$		

$$O = XA\bar{B} + Xz\bar{B}$$

$$= X\bar{B}(A+z)$$