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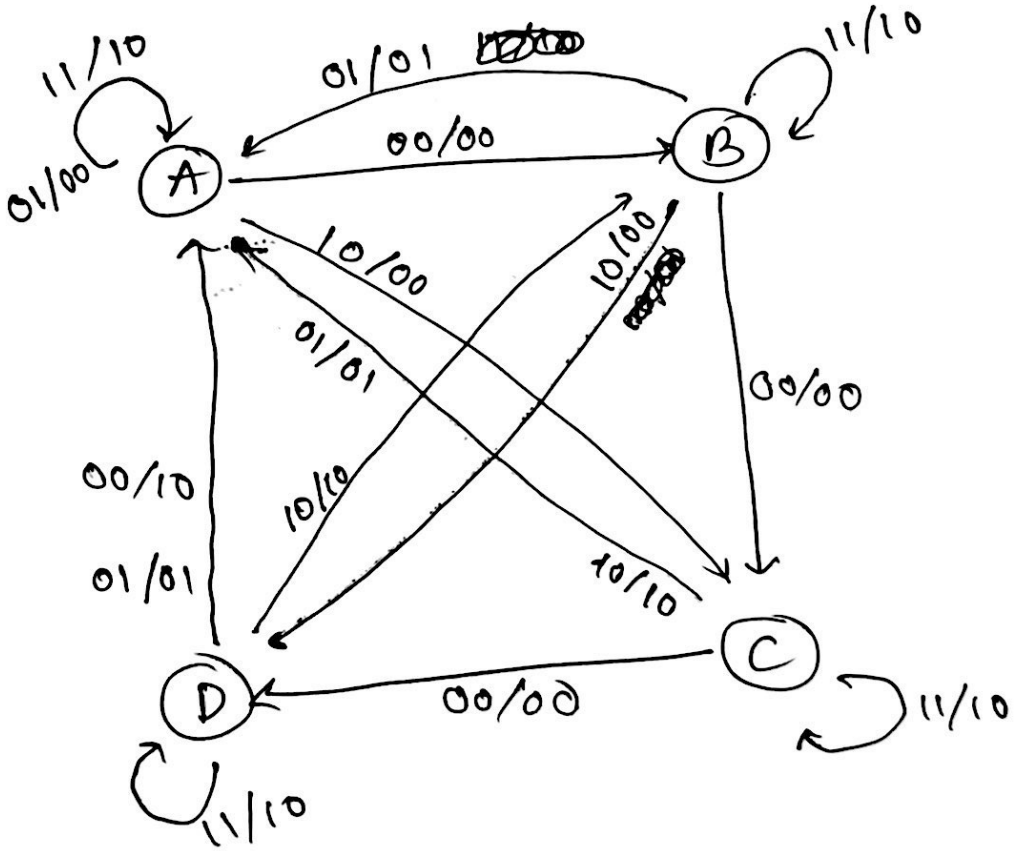
Problem 1:

State Diagram:

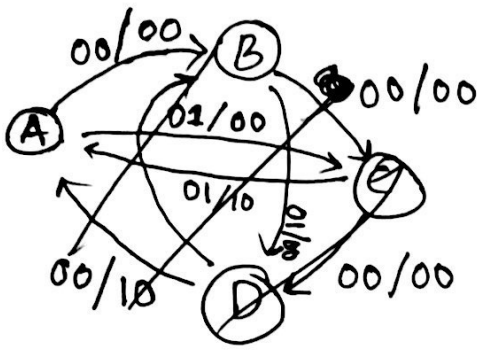


A = 0 tk = 00

B = 5 tk = 01

C = 10 tk = 10

D = 15 tk = 11



Excitation Table:

$y_1 y_0$	$x_1 x_0$	$Y_1 Y_0$	J_1	K_1	J_0	K_0	Z_{10}	Z_{02}
0 0	0 0	0 1	0	x	1	x	0	0
0 0	0 1	0 0	0	x	0	x	0	0
0 0	1 0	1 0	1	x	0	x	0	0
0 0	1 1	0 0	0	x	0	x	1	0
0 1	0 0	1 0	1	x	x	1	0	0
0 1	0 1	0 0	0	x	x	1	0	1
0 1	1 0	1 1	1	x	x	0	0	0
0 1	1 1	0 1	0	x	x	0	1	0
1 0	0 0	1 1	x	0	1	x	0	0
1 0	0 1	0 0	x	1	0	x	0	1
1 0	1 0	0 0	x	1	0	x	1	0
1 0	1 1	0 1 0	x	0	0	x	1	0
1 1	0 0	0 0	x	1	x	1	1	0
1 1	0 1	0 0	x	1	x	1	0	1
1 1	1 0	0 1	x	1	x	0	1	0
1 1	1 1	1 1	x	0	x	0	1	0

J_1

x_1x_0 \ y_1y_0	00	01	11	10
00	0	1	X	X
01	0	0	X	X
11	0	0	X	X
10	1	1	X	X

$$J_1 = y_0\bar{x}_0 + x_1\bar{x}_0$$
$$= \bar{x}_0\,(x_1 + y_0)$$

K_1

x_1x_0 \ y_1y_0	00	01	11	10
00	X	X	1	0
01	X	X	1	1
11	X	X	0	0
10	X	X	1	1

$$K_1 = y_0\bar{x}_1 + \bar{x}_1 x_0 + x_1\bar{x}_0$$
$$= \bar{x}_1\,(x_0 + y_0) + x_1\bar{x}_0$$

J_0

x_1x_0 \ y_1y_0	00	01	11	10
00	1	X	X	1
01	0	X	X	0
11	0	X	X	0
10	0	X	X	0

$$J_0 = \bar{x}_1\bar{x}_0$$

K_0

x_1x_0 \ y_1y_0	00	01	11	10
00	X	1	1	X
01	X	1	1	X
11	X	0	0	X
10	X	0	0	X

$$K_0 = \bar{x}_1$$

Z_1

x_1x_0 \ y_1y_0	00	01	11	10
00	0	0	1	0
01	0	0	0	0
11	1	1	1	1
10	0	0	1	1

Z_2

x_1x_0 \ y_1y_0	00	01	11	10
00	0	0	0	0
01	0	1	1	1
11	0	0	0	0
10	0	0	0	0

$$Z_1 = x_1x_0 + x_1y_1 + \bar{x}_0y_1y_0$$
$$= x_1(x_0 + y_1) + \bar{x}_0y_1y_0$$

$$Z_2 = \bar{x}_1x_0y_0 + \bar{x}_1x_0y_1$$
$$= \bar{x}_1x_0(y_0 + y_1)$$