SIDDHI SINGH

17BIT0028

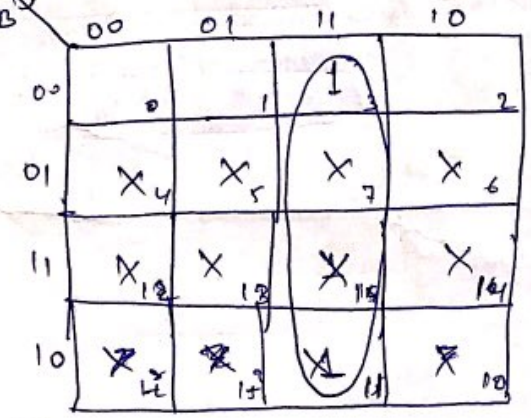
EXPERIMENT - 5.

Q. Design a mod-16 counter using J-K flip-flop.

P.S.				N.S.											
A	B	C	D	A	B	C	D	J_1	K_1	J_2	K_2	J_3	K_3	J_4	K_4
0	0	0	0	0	0	0	1	0	X	0	X	0	X	1	X
0	0	0	1	0	0	1	0	0	X	0	X	1	X	X	1
0	0	1	0	0	0	1	1	0	X	0	X	X	0	1	X
0	0	1	1	0	1	0	0	0	X	1	X	X	1	X	1
0	1	0	0	0	1	0	1	0	X	X	X	0	X	1	X
0	1	0	1	0	1	1	0	0	X	X	X	1	X	X	1
0	1	1	0	0	1	1	1	0	X	X	X	X	0	1	X
0	1	1	1	1	0	0	0	1	X	X	1	X	1	X	1
1	0	0	0	1	0	0	1	X	0	X	X	0	X	1	X
1	0	0	1	1	0	1	0	X	0	X	X	1	X	X	1
1	0	1	0	1	0	1	1	X	0	X	X	X	0	1	X
1	0	1	1	1	1	0	0	X	0	1	X	X	1	X	1
1	1	0	0	1	1	0	1	X	0	X	0	0	X	1	X
1	1	0	1	1	1	1	0	X	0	X	0	1	X	X	1
1	1	1	0	1	1	1	1	X	0	X	0	X	0	1	X
1	1	1	1	0	0	0	0	X	1	X	1	X	1	X	1

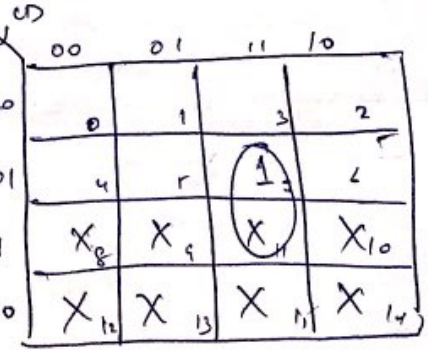
~~$J_1 = K_1 = 0$~~

$J_2 =$



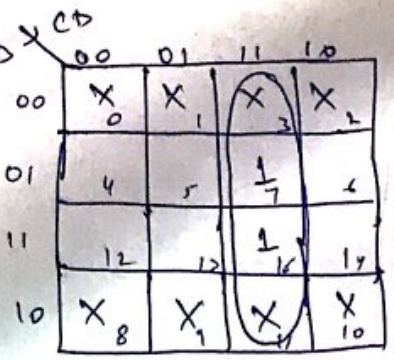
$J_2 = CD$

$J_1 =$



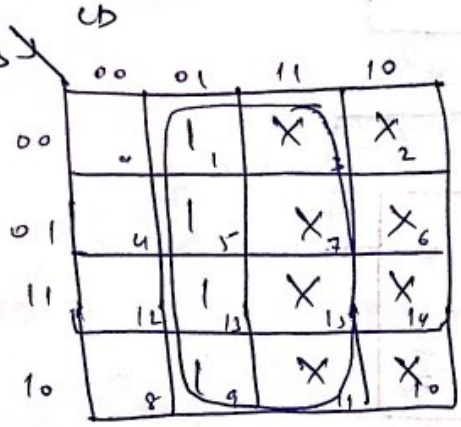
$= BCD = K_4$

$K_2 = AD$



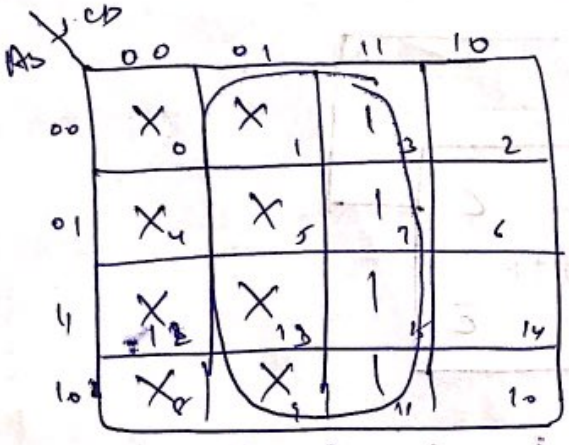
$= CD$

$J_3 = AD$



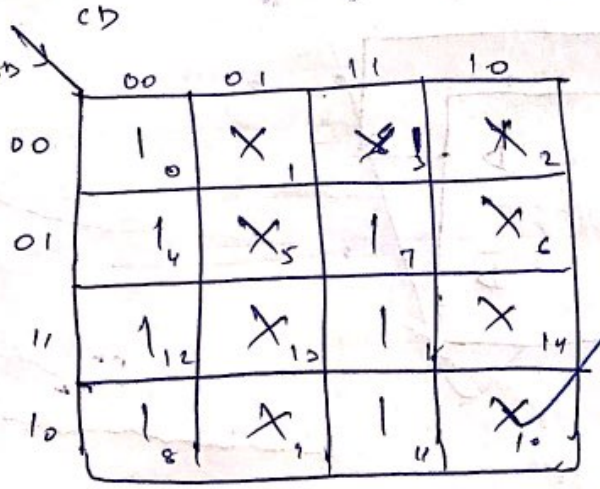
$= D$

$K_3 =$



$= D$

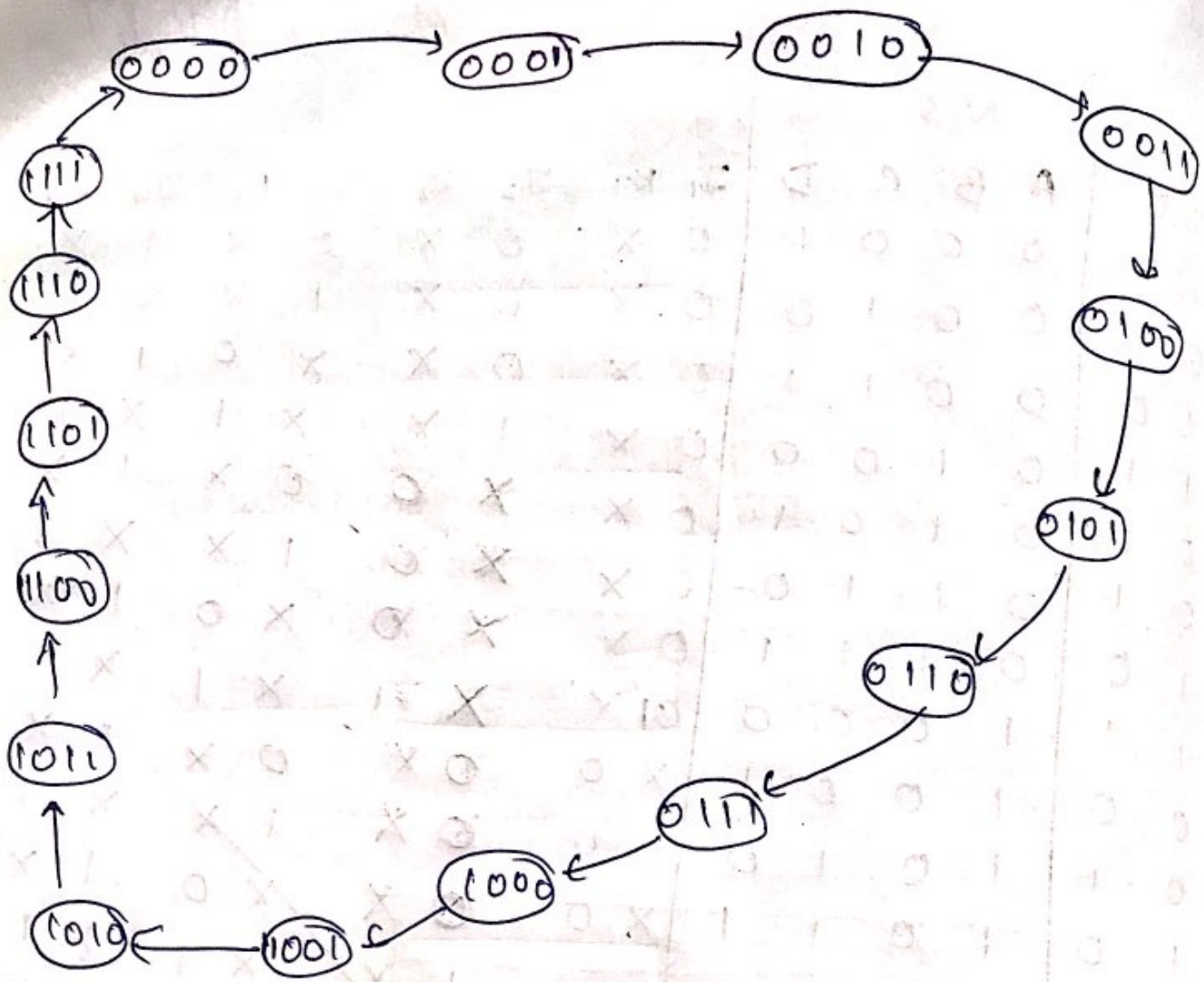
$J_4 = AD$

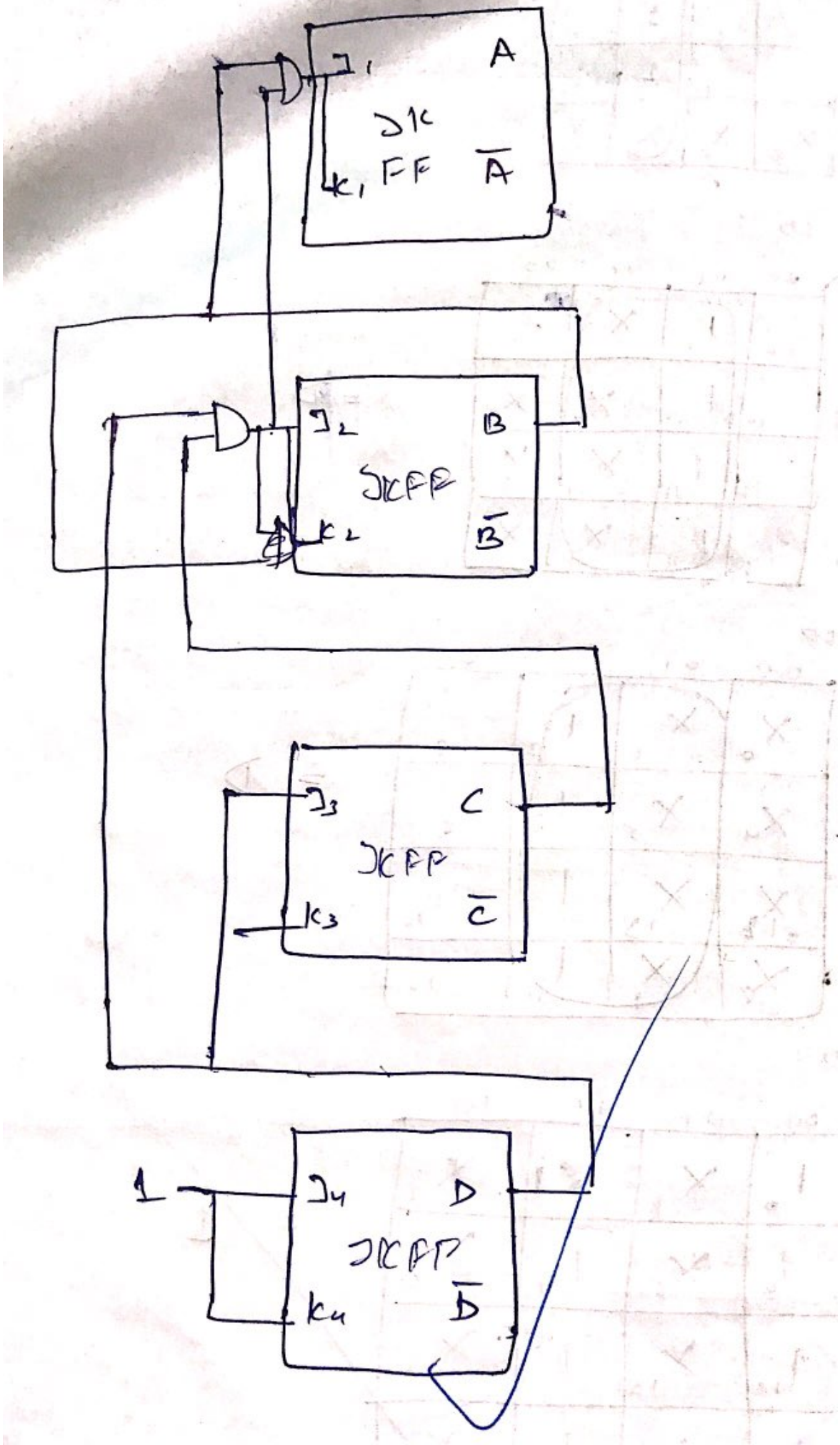


$= 1$

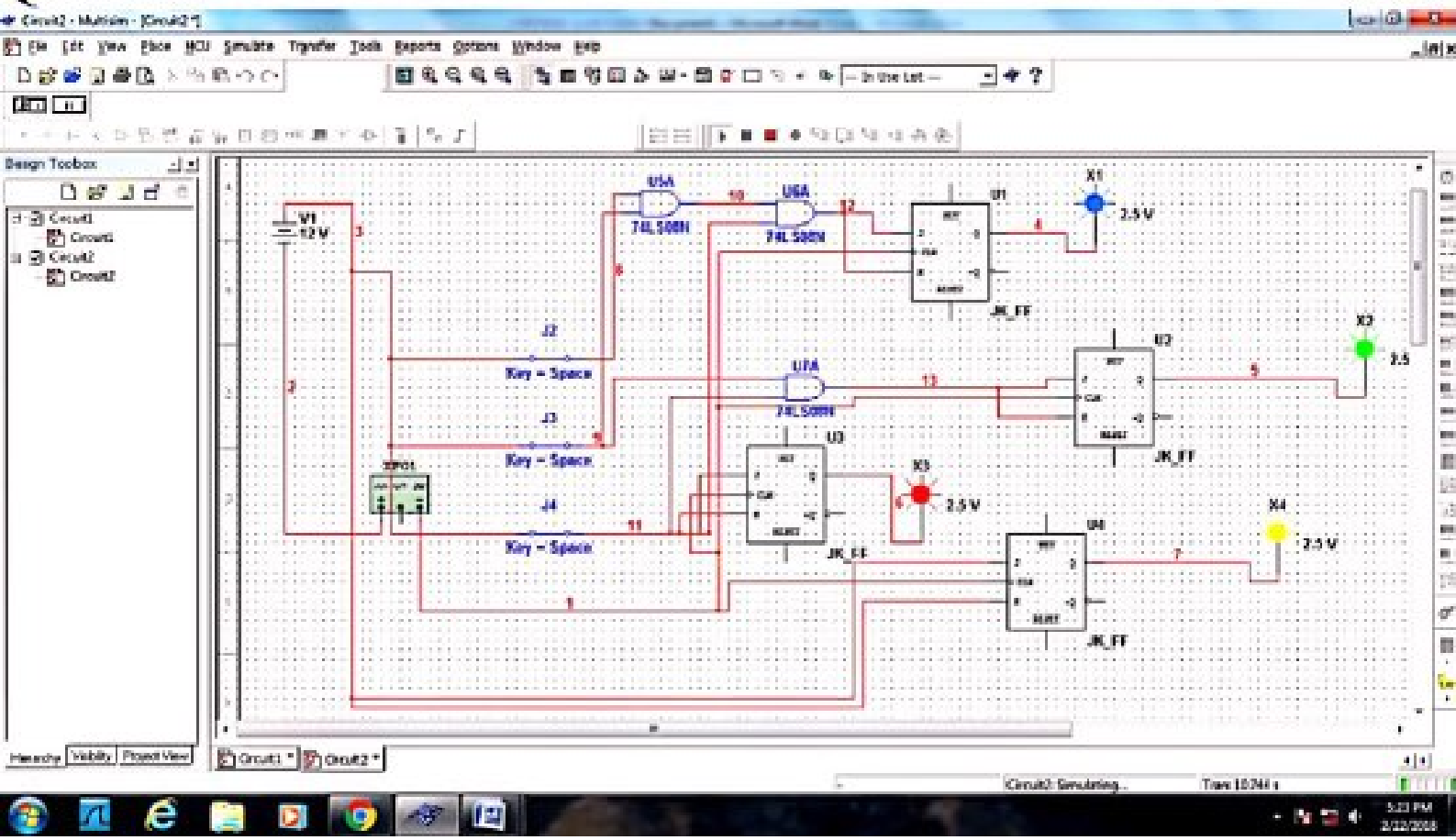
$K_4 = 1$

STATE DIAGRAM





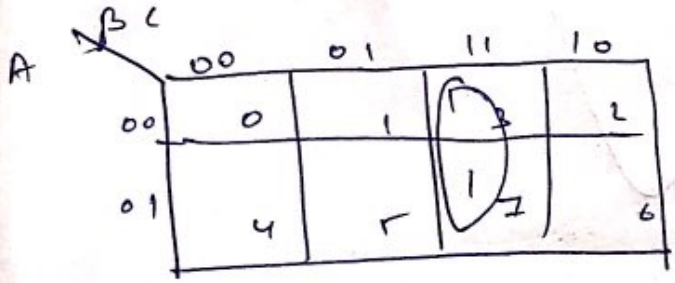
QUES 1



Q. Design a mod 8 counter using T flip-flop.

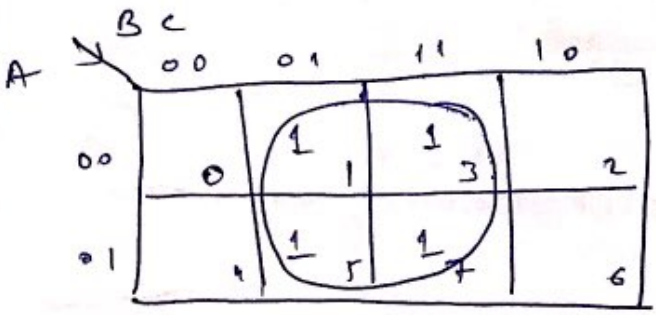
P.S.			N.S.					
A	B	C	A	B	C	T_A	T_B	T_C
0	0	0	0	0	1	0	0	1
0	0	1	0	1	0	0	1	1
0	1	0	0	1	1	0	0	1
0	1	1	1	0	0	1	1	1
1	0	0	1	0	1	0	0	1
1	0	1	1	1	0	0	1	1
1	1	0	1	1	1	0	0	1
1	1	1	0	0	0	1	1	1

$T_A = \Sigma(3,7) = BC$



$= BC$

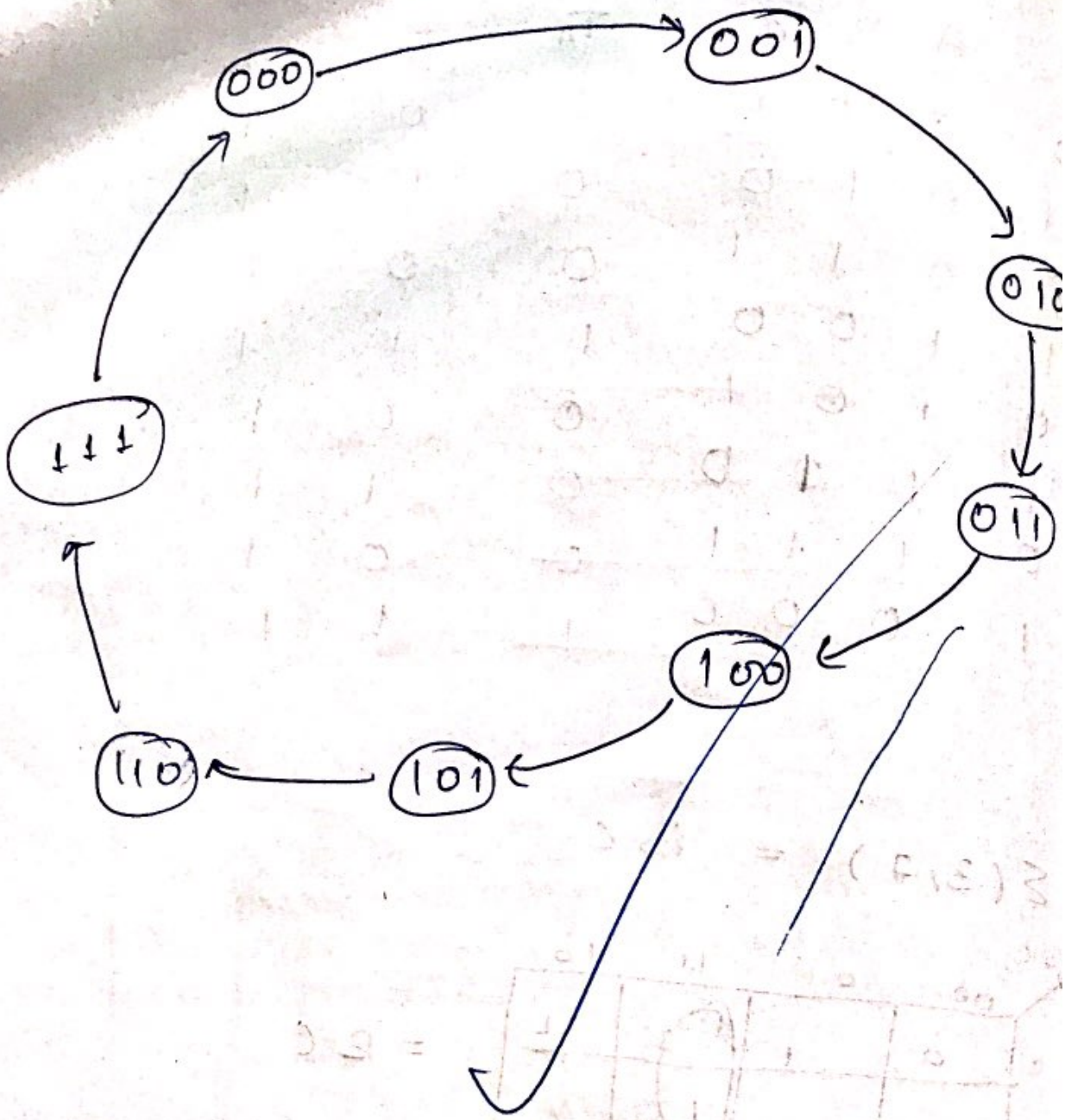
$T_B = \Sigma(1,3,5,7) = C$

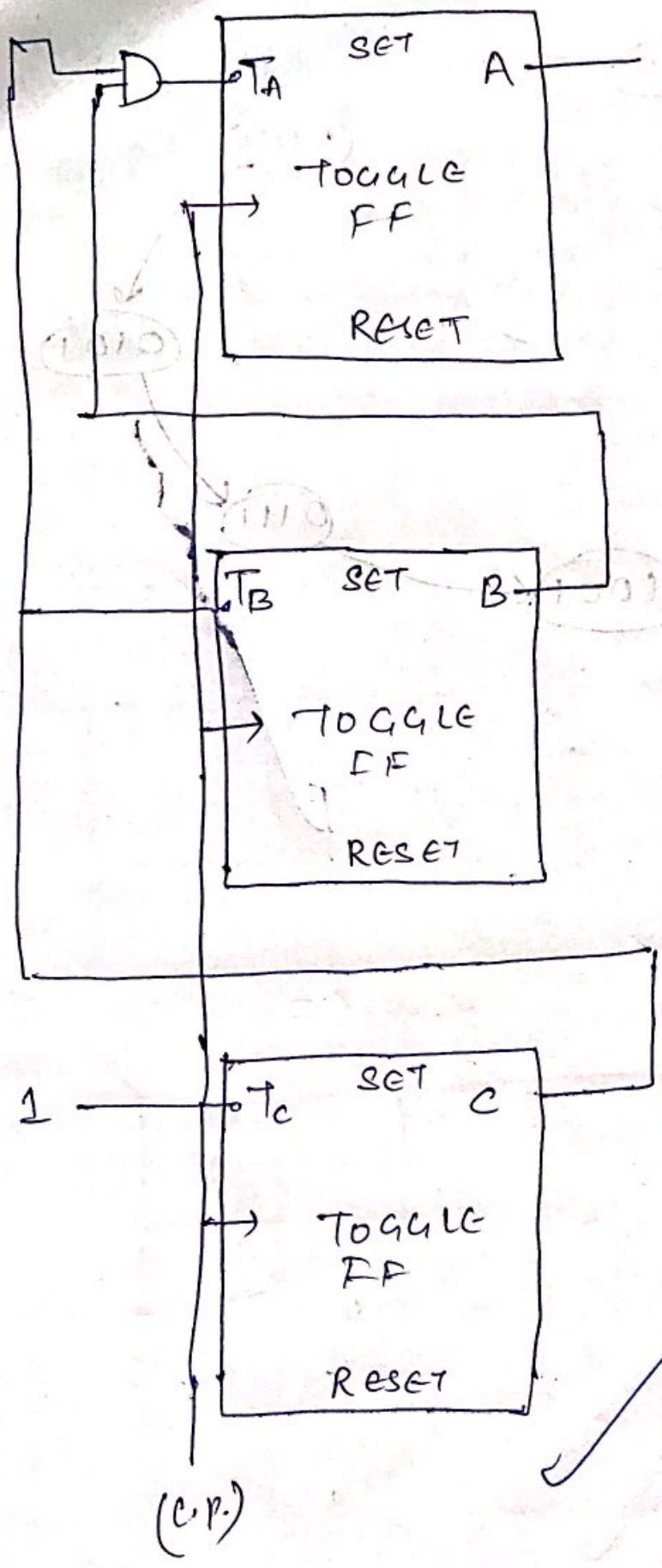


$= C$

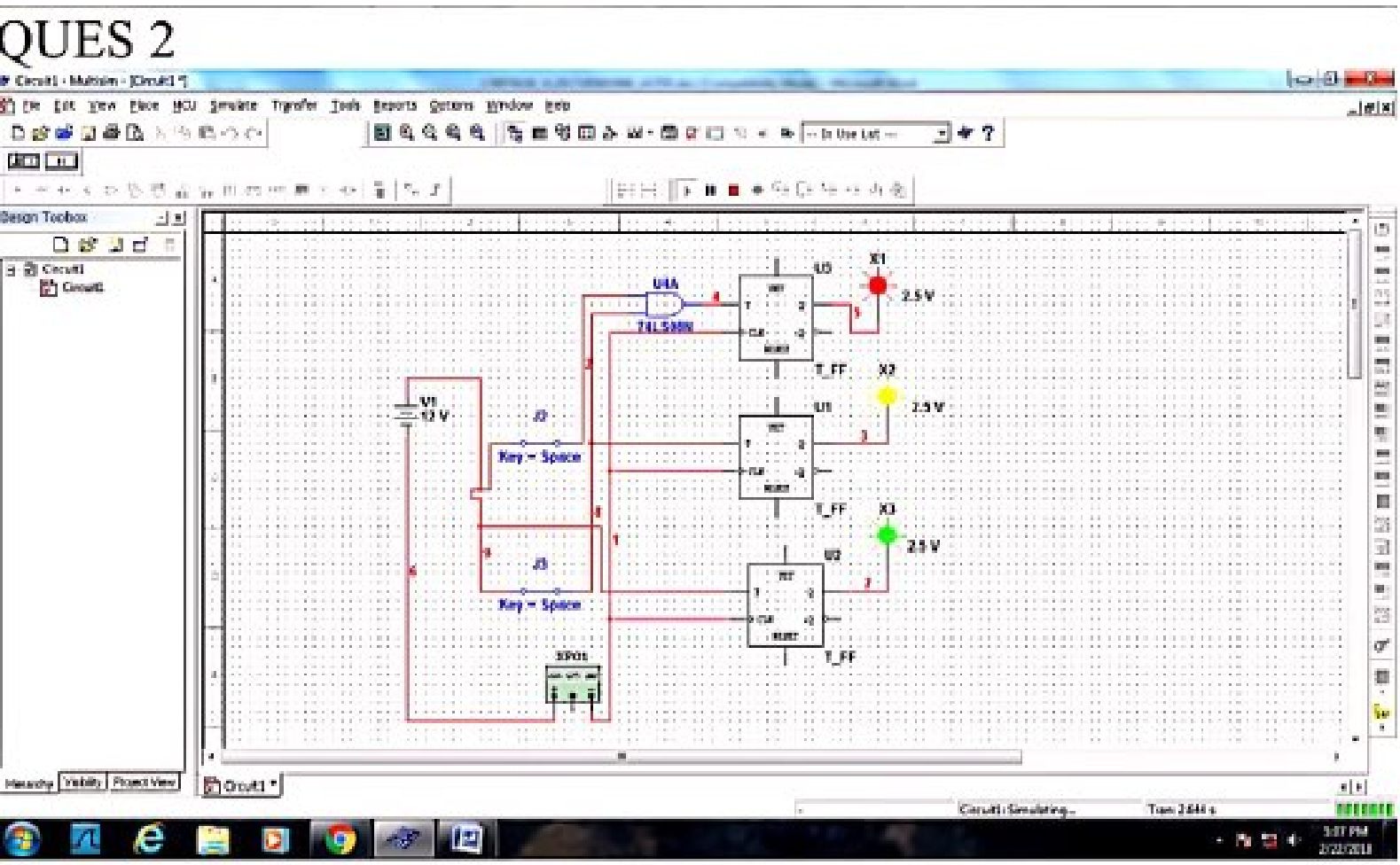
$T_C = 1$

STATE DIAGRAM





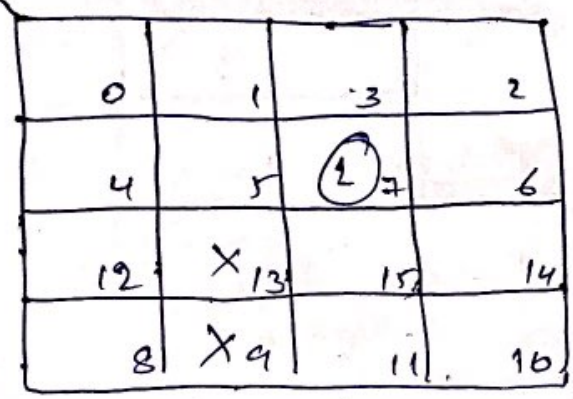
QUES 2



Q. Design a counter for the following sequence :-
0, 2, 5, 7, 9, 13, 0 ---- using J-K flip-flop.

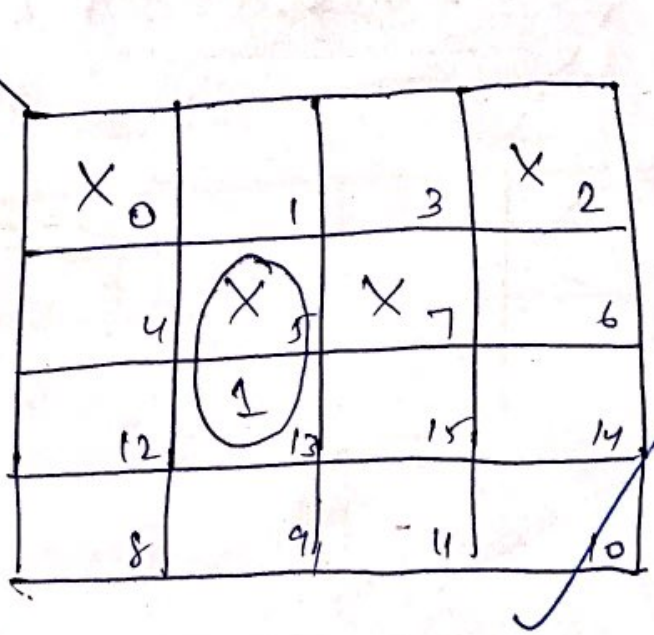
A	B	C	D	J_1	K_1	J_2	K_2	J_3	K_3	J_4	K_4	A	B	C	D
0	0	0	0	0	X	0	X	1	X	0	X	0	0	1	0
0	0	1	0	0	X	1	X	X	1	1	X	0	1	0	1
0	1	0	1	0	X	X	0	1	X	X	0	0	1	1	1
0	1	1	1	1	X	X	1	X	1	X	0	1	0	0	1
1	0	0	1	X	0	1	X	0	X	X	0	1	1	0	1
1	1	0	1	X	1	X	1	0	X	X	1	0	0	0	0

J_1 =



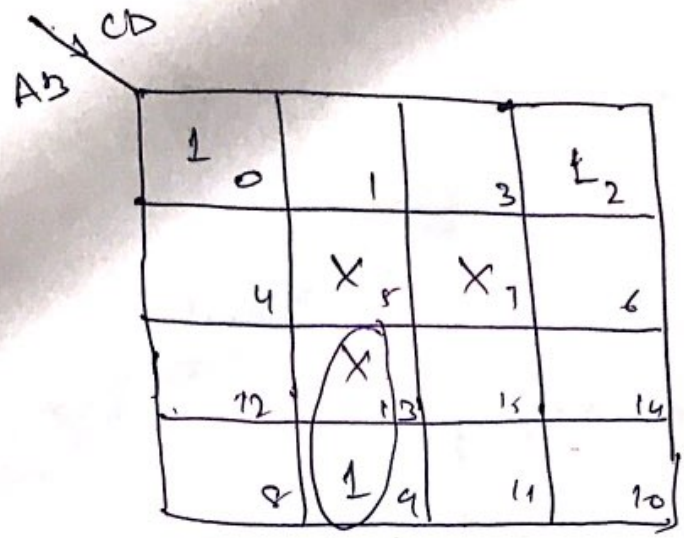
$= \bar{A}BCD$

K_1 =



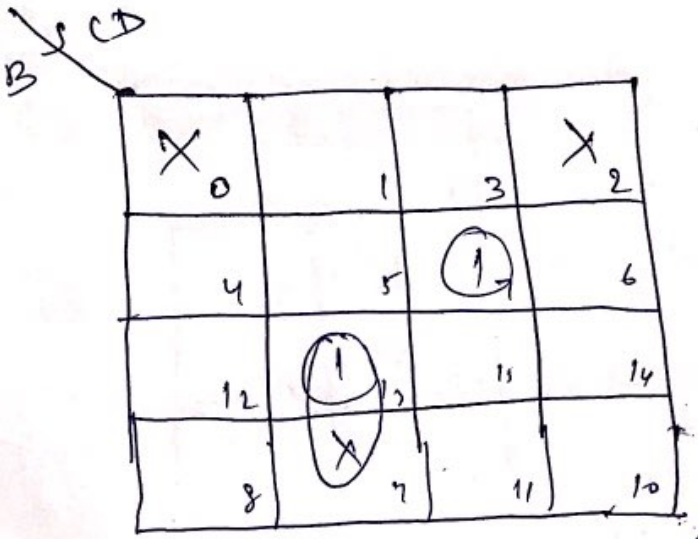
$= B\bar{C}D$

$J_2 =$



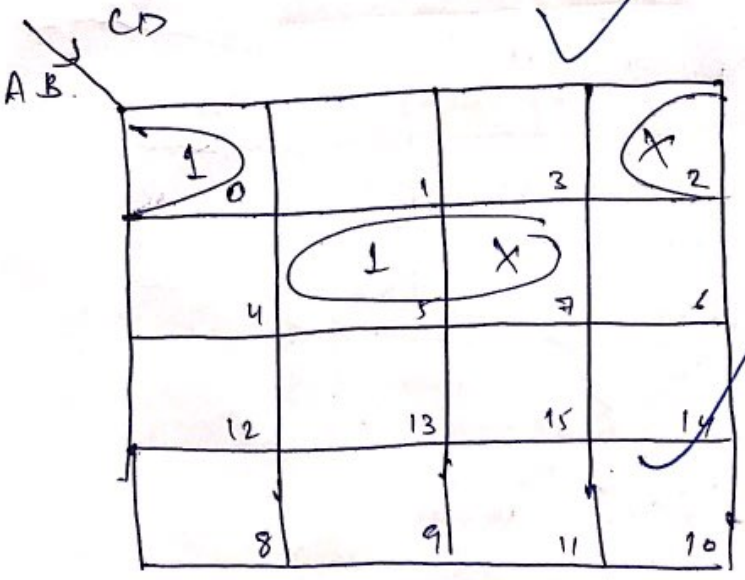
$= \bar{A}\,\bar{B}\,C\,\bar{D} + A\,\bar{C}\,D$

$K_2 =$



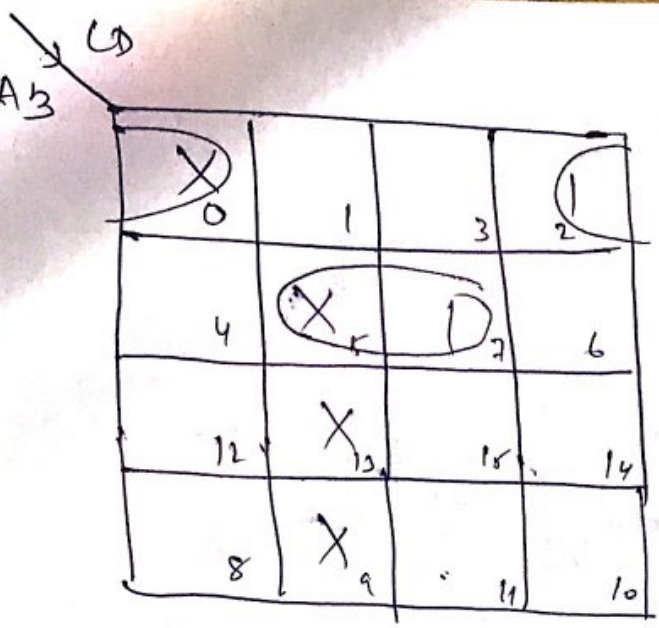
$= \bar{A}\,B\,C\,D + A\,\bar{C}\,D$

$J_3 =$



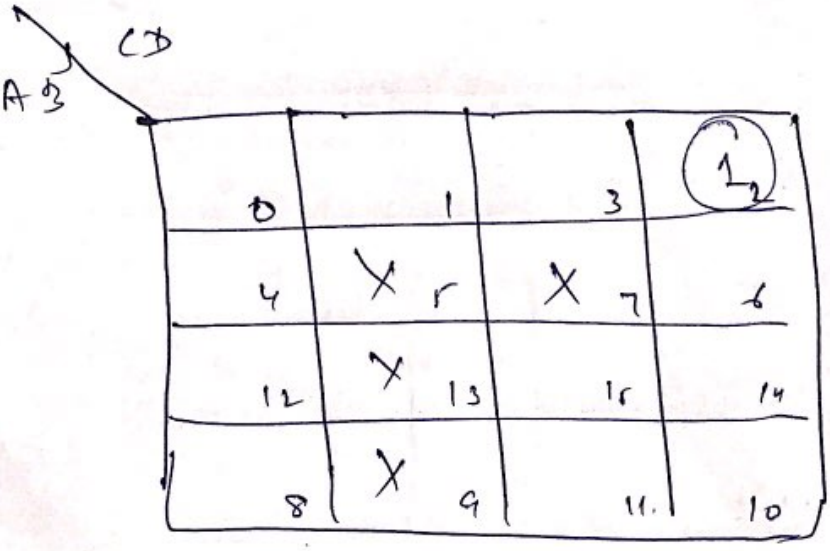
$= \bar{A}\,\bar{B}\,\bar{D} + \bar{A}\,B\,\bar{C}$

$K_3 =$



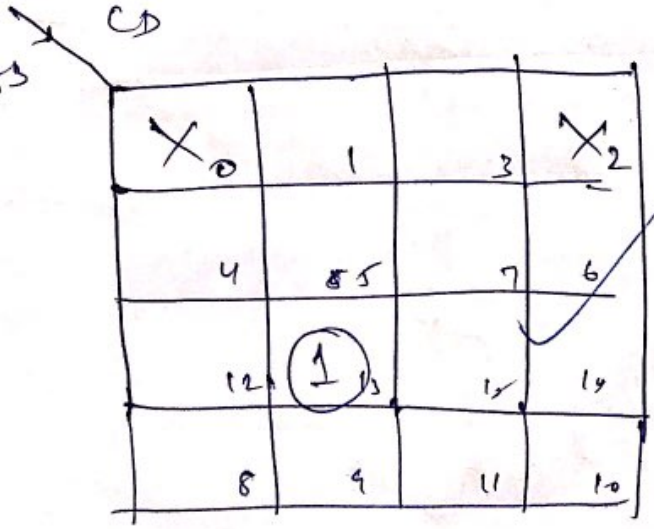
$= \bar{A}\bar{B}D + \bar{A}B\bar{C}$

$J_4 =$



$= \bar{A}\bar{B}C\bar{D}$

$K_4 = AB$



$AB\bar{C}D$

STATE DIAGRAM