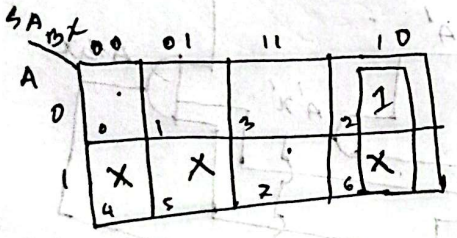
10

Here A

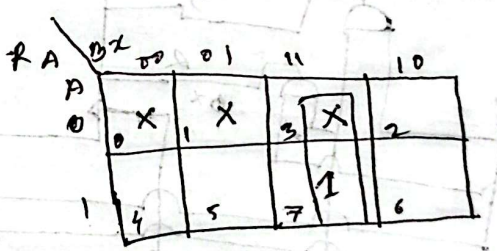
A	B	X	A^+	B^+	S_A	R_A	S_B	R_B
0	0	0	0	0	0	x	0	x
0	0	1	0	1	0	x	1	0
0	1	0	1	0	1	0	0	1
0	1	1	0	1	0	x	x	0
1	0	0	1	0	x	0	0	x
1	0	1	1	1	x	0	1	0
1	1	0	1	1	x	0	x	0
1	1	1	0	0	0	1	0	1

fm SR FF

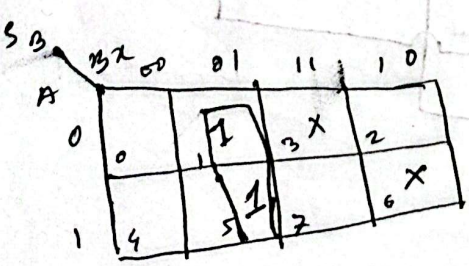
B_n	B^+	S	R
0	0	0	x
0	1	1	0
1	0	0	1
1	1	x	0



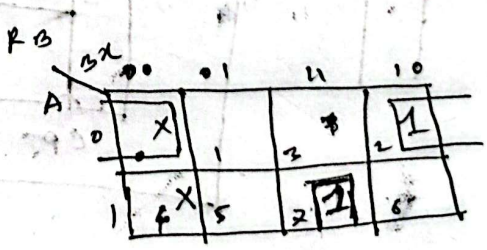
$S_A = BX'$



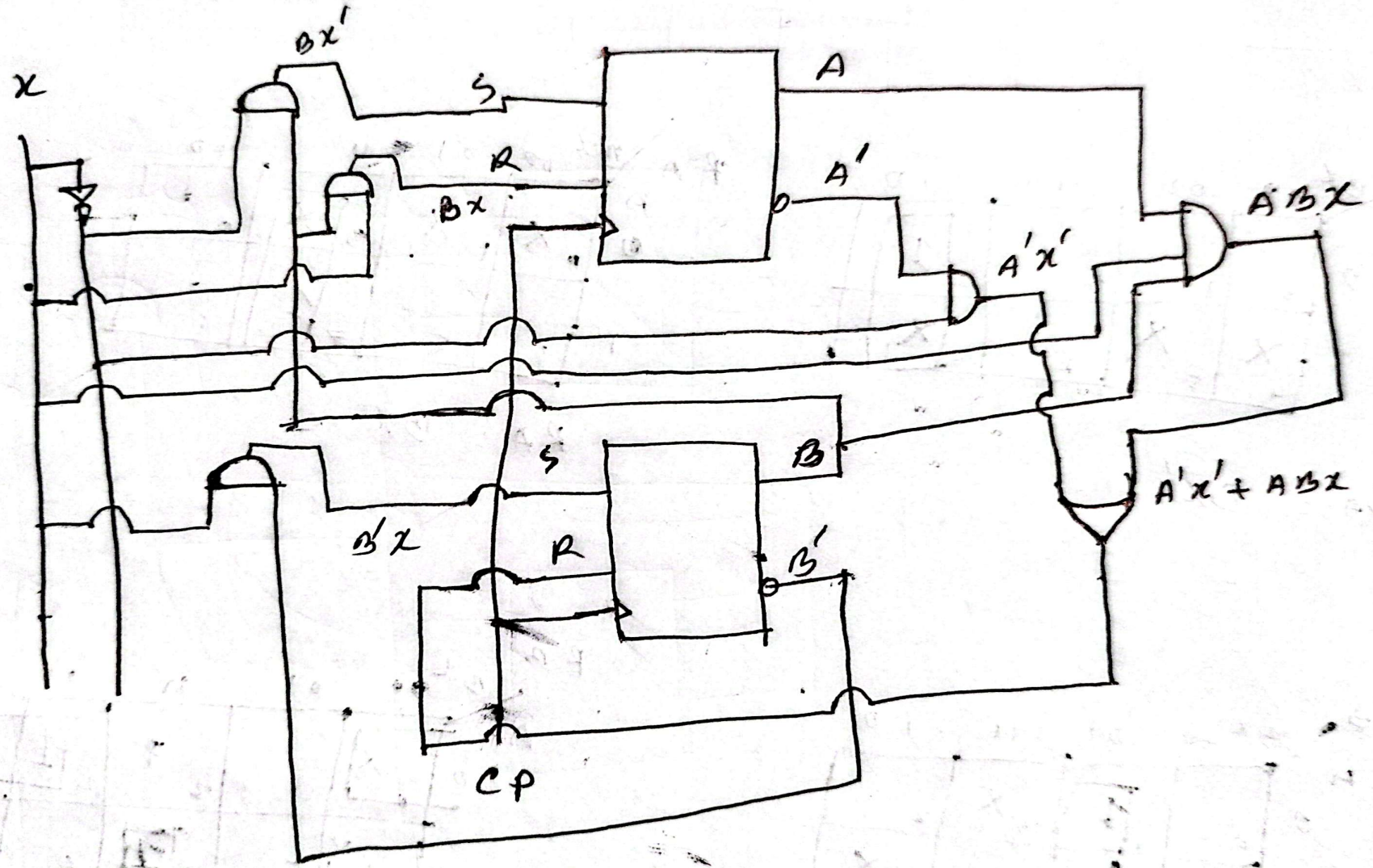
$R_A = BX$



$S_B = B'X$



$R_B = A'X' + ABX$


x
Bx'
S
R
Bx
A
A'
A'x'
ABx
B
S
B'x
R
B'
Cp
A'x' + ABx

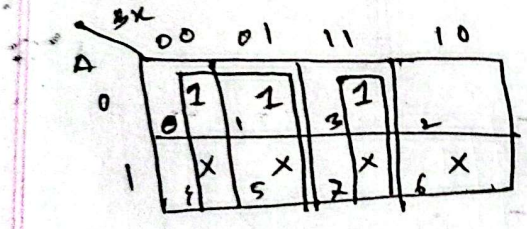
2.11

A	B	x	A^+	B^+	y	J_A	K_A	J_B	K_B
0	0	0	1	0	0	1	x	0	x
0	0	1	1	1	0	1	x	1	x
0	1	0	0	1	1	0	x	x	0
0	1	1	1	1	0	1	x	x	0
1	0	0	1	1	1	x	0	1	x
1	0	1	1	0	0	x	0	0	x
1	1	0	1	1	1	x	0	x	0
1	1	1	1	0	0	x	0	x	1

for JK FF

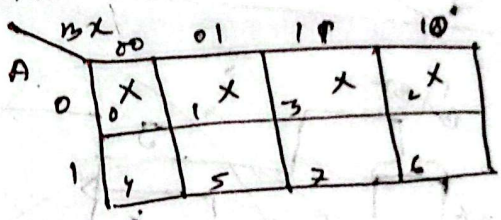
B_n	B_{n+1}	J	K
0	0	0	x
0	1	1	x
1	0	x	1
1	1	x	0

J_A



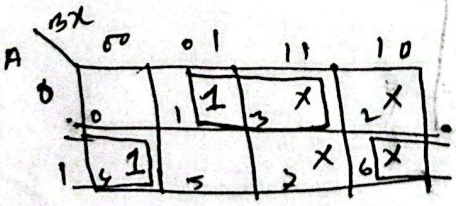
$J_A = B' + Bx$

K_A



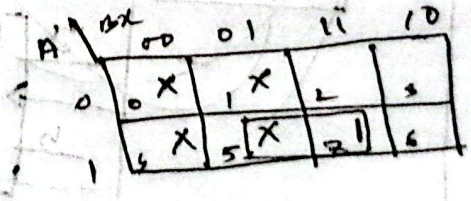
$K_A = 0$

J_B

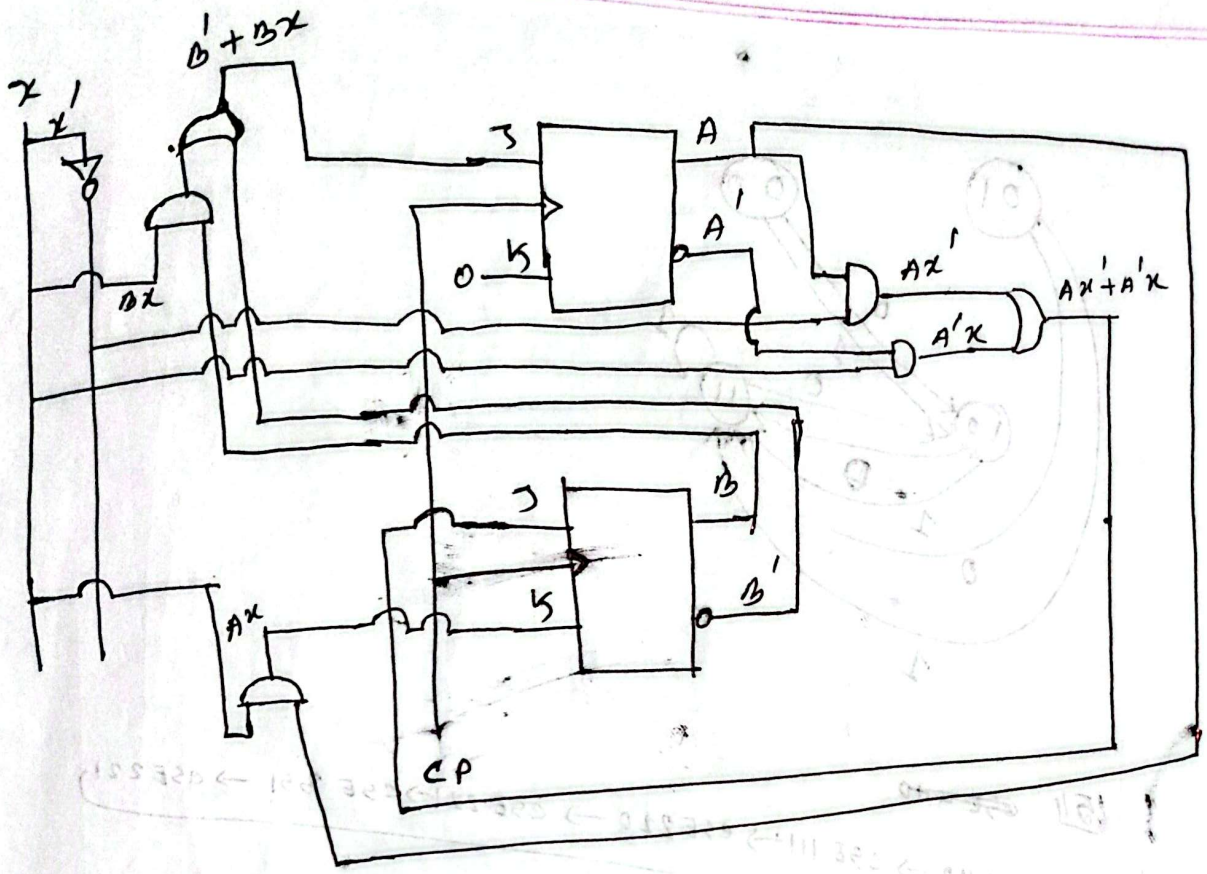


$J_B = Ax' + A'x$

K_B



$K_B = Ax$



4) Equations

$J_A = x' + A' + B'$

$K_A = A'$

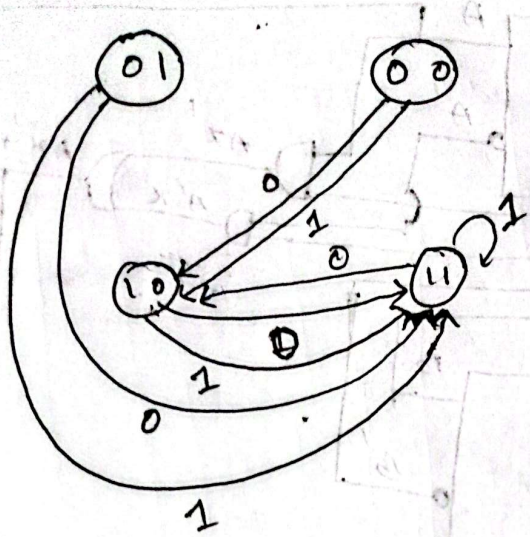
$J_B = A' \oplus B'$

$K_B = x'A$

A	B	x	A^+	J_A	K_A	J_B	K_B	A^+	B^+
0	0	0		1	1	0	0	1	0
0	0	1		1	1	0	0	1	0
0	1	0		1	1	1	0	1	1
0	1	1		1	1	1	0	1	1
1	0	0		1	0	1	1	1	1
1	0	1		1	0	1	0	1	1
1	1	0		1	0	0	1	1	0
1	1	1		0	0	0	0	1	1

B(t)	J	K	B(t+1)
0	0	0	0
0	0	1	0
0	1	0	1
0	1	1	1
1	0	0	1
1	0	1	0
1	1	0	1
1	1	1	0

JK characteristics table



5)

~~CSE 110~~

CSE 110 → CSE 111 → CSE 220 → CSE 221 → CSE 331 → CSE 221

↪ CSE 321 → CSE 110

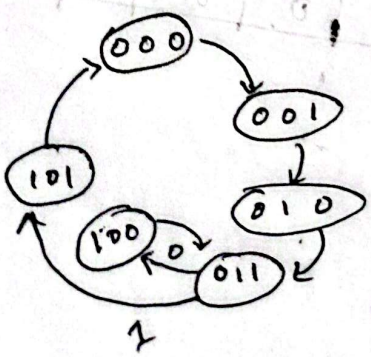
Unique combo → 6

bit needed → 2^3 → 8 → 3 bit

0 1

CSE 110 → CSE 111 → CSE 220 → CSE 221 → CSE 331 → CSE 221 → CSE 321 → CSE 110

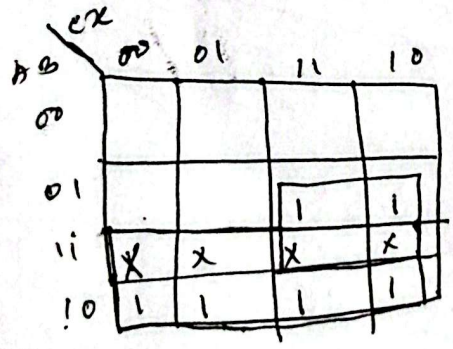
000 001 010 011 100 011 101 000



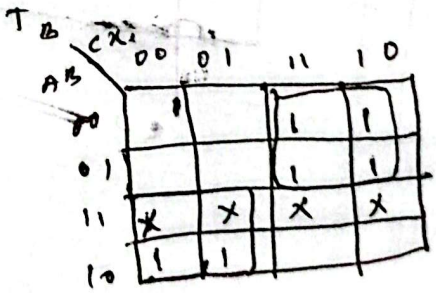
Q	Q+	T
0	0	0
0	1	1
1	0	1
1	1	0

A	B	C	x	A+	B+	C+	T_A	T_B	T_C
0	0	0	0	0	0	1	0	0	1
0	0	0	1	0	0	1	0	0	1
0	0	1	0	0	1	0	0	1	1
0	0	1	1	0	1	0	0	1	1
0	1	0	0	0	1	1	0	0	1
0	1	0	1	0	1	1	0	0	1
0	1	1	0	1	0	0	1	1	1
0	1	1	1	1	0	1	1	1	0
1	0	0	0	0	1	1	1	1	1
1	0	0	1	0	1	1	1	1	1
1	0	1	0	0	0	0	1	0	1
1	0	1	1	0	0	0	1	0	1
1	1	0	0	x	x	x	x	x	x
1	1	0	1	x	x	x	x	x	x
1	1	1	0	x	x	x	x	x	x
1	1	1	1	x	x	x	x	x	x

T_A



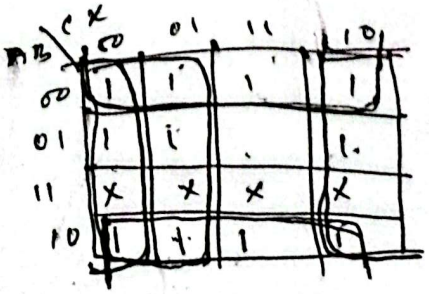
T_B



$T_B = cA' + AC'$

$= Bc + A$

T_C



$T_C \Rightarrow c' + B' + x'$

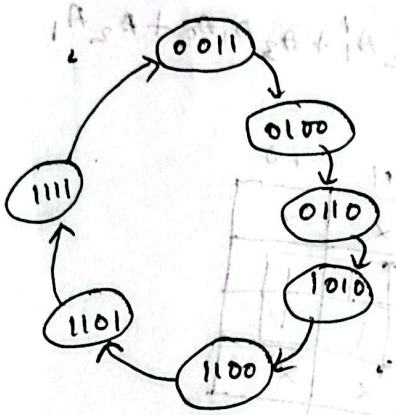
x
Bc+A
TA
TB
Tc
A
B
C
A'
B'
C'
A'c
Ac'

64

3 → 4 → 6 → 10 → 12 → 13 → 15 → 3

0011 0100 0110 1010 1100 1101 1111 0011

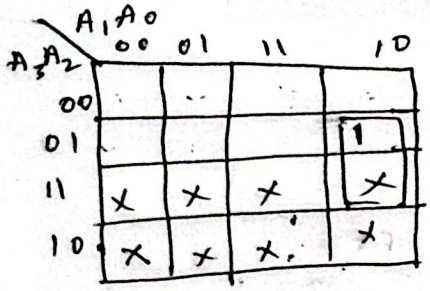
Highest bit → 4



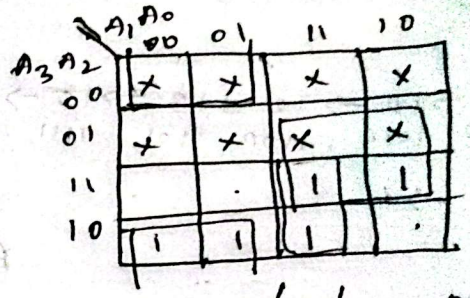
for JK FF

Q	Q^+	J	K
0	0	0	x
0	1	1	x
1	0	x	1
1	1	x	0

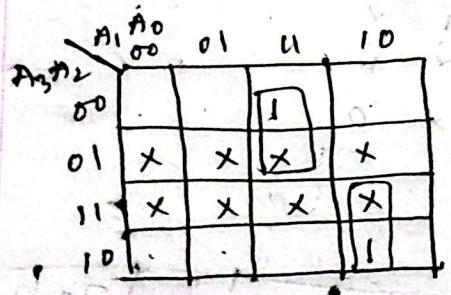
	A_3	A_2	A_1	A_0	A_3^+	A_2^+	A_1^+	A_0^+	JA_3	KA_3	JA_2	KA_2	JA_1	KA_1	JA_0	KA_0
0	0	0	0	0	0	0	1	1	0	x	0	x	1	x	1	x
1	0	0	0	1	0	0	1	1	0	x	0	x	1	x	x	0
2	0	0	1	0	0	0	1	1	0	x	0	x	x	0	1	x
3	0	0	1	1	0	1	0	0	0	x	1	x	x	1	x	1
4	0	1	0	0	0	1	1	0	0	x	x	0	1	x	0	x
5	0	1	0	1	0	0	1	1	0	x	x	1	1	x	x	0
6	0	1	1	0	1	0	1	0	1	x	x	1	x	0	0	x
7	0	1	1	1	0	0	1	1	0	x	x	1	x	0	x	0
8	1	0	0	0	0	0	1	1	x	1	0	x	1	x	1	x
9	1	0	0	1	0	0	1	1	x	1	0	x	1	x	x	0
10	1	0	1	0	1	1	0	0	x	0	1	x	x	1	0	x
11	1	0	1	1	0	0	1	1	x	1	0	x	x	0	x	0
12	1	1	0	0	1	1	0	1	x	0	x	0	0	x	1	x
13	1	1	0	1	1	1	1	1	x	0	x	0	1	x	x	0
14	1	1	1	0	0	0	1	1	x	1	x	1	x	0	1	x
15	1	1	1	1	0	0	1	1	x	1	x	1	x	0	x	



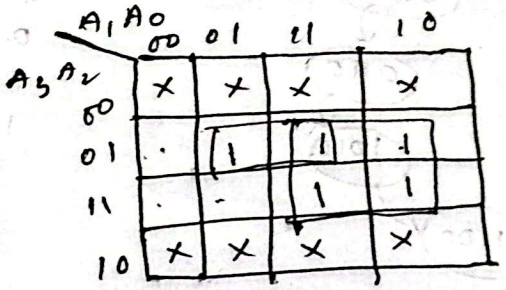
$J_{A_3} = A_2 A_1 A_0'$



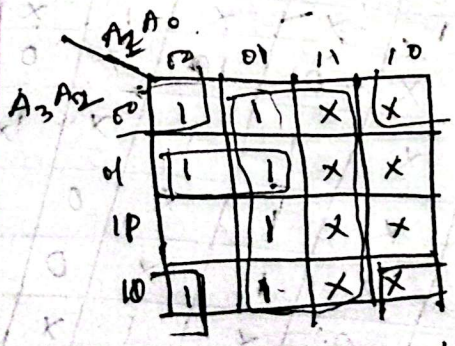
$K_{A_3} = A_2' A_1' + A_3 A_1 A_0 + A_2 A_1$



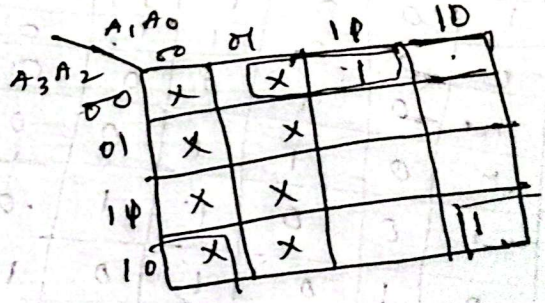
$J_{A_2} = A_3' A_1 A_0 + A_3 A_1 A_0'$



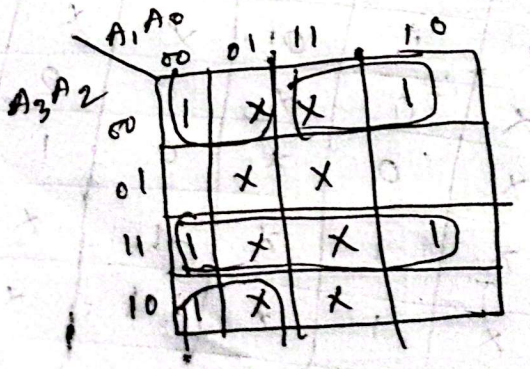
$K_{A_2} = A_3' A_2 A_0 + A_2 A_1$



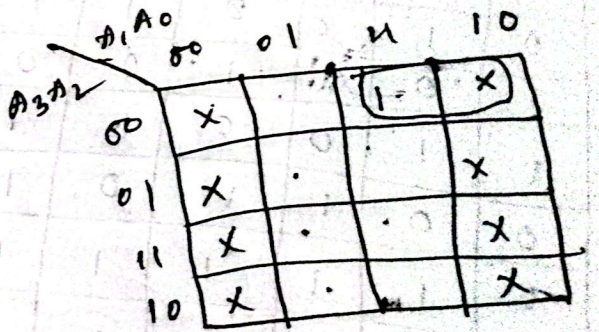
$J_{A_1} = A_0 + A_3' A_2 A_2' + A_2' A_0'$



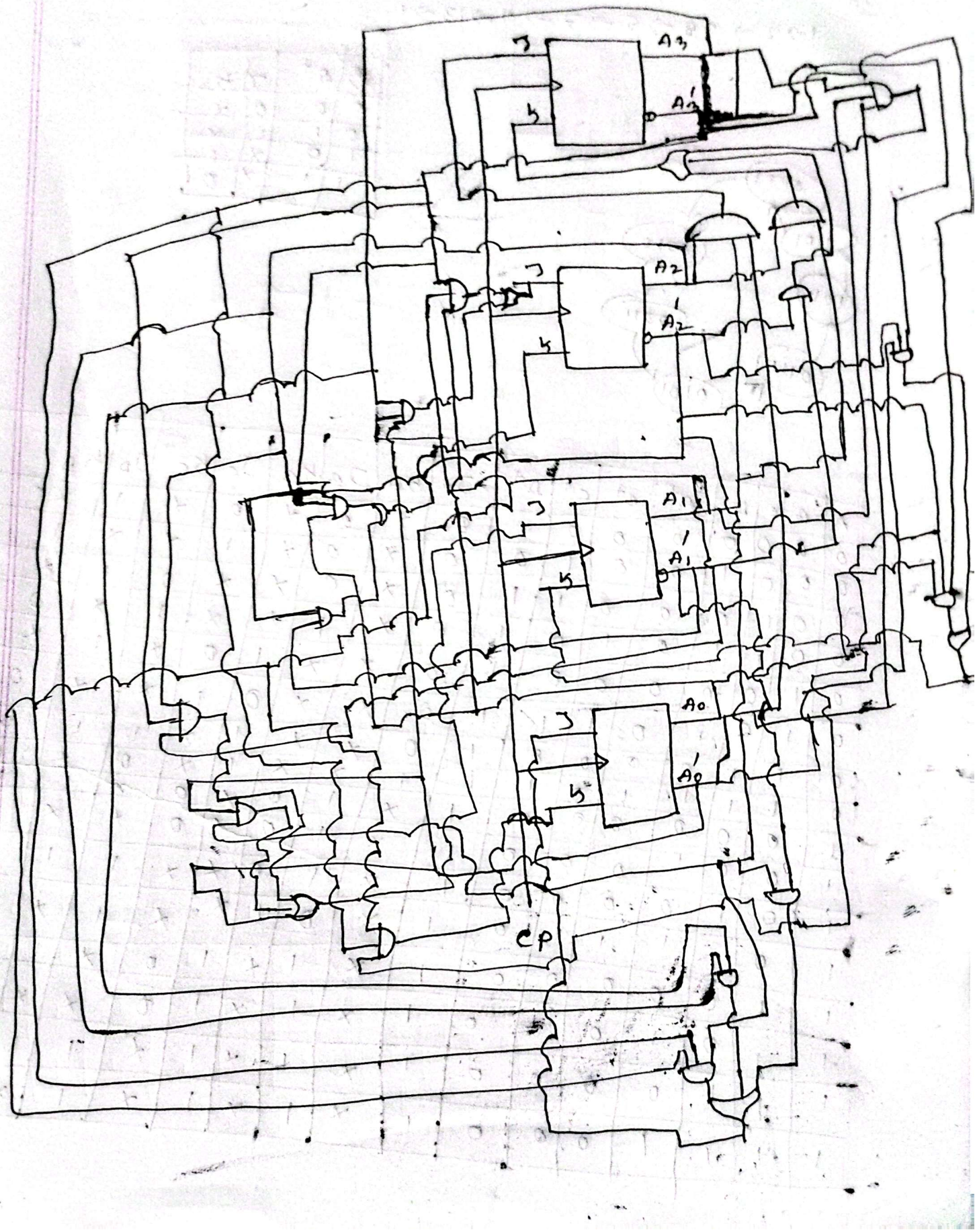
$K_{A_1} = A_3 A_2' A_0 + A_0 A_3' A_2'$



$J_{A_0} = A_1' A_2' + A_3 A_2 + A_3' A_2' A_1$

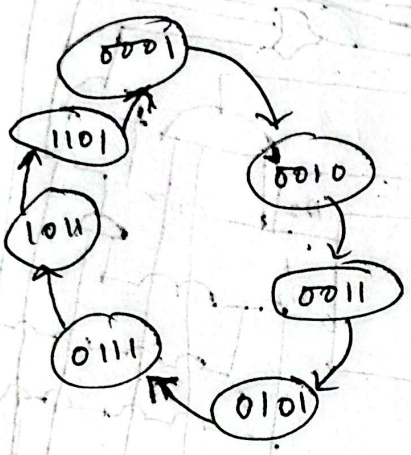


$K_{A_0} = A_3' A_2' A_1$


J
K
A_3
A_3'
A_2
A_2'
A_1
A_1'
A_0
A_0'
CP

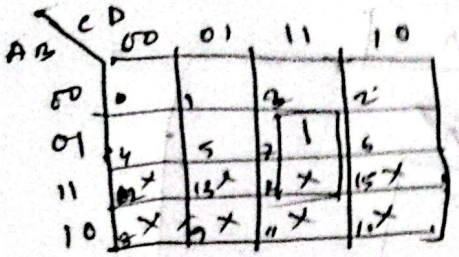
9.11

1 → 2 → 3 → 5 → 7 → 11 → 13 → 1

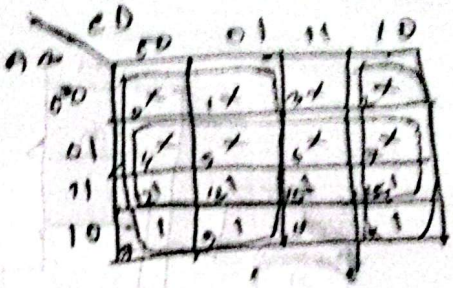


B	B^+	T_B	K_B
0	0	0	x
0	1	1	x
1	0	x	1
1	1	x	0

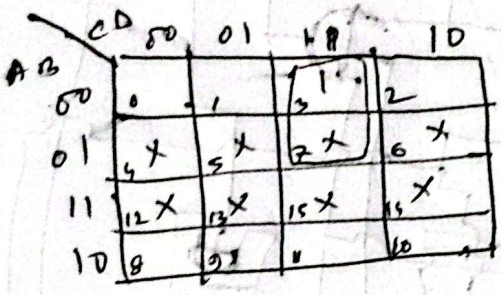
A	B	C	D	A^+	B^+	C^+	D^+	J_A	K_A	J_B	K_B	J_C	K_C	J_D	K_D
0	0	0	0	0	0	0	1	0	x	0	x	0	x	1	x
0	0	0	1	0	0	1	0	0	x	0	x	1	x	x	1
0	0	1	0	0	0	1	1	0	x	0	x	x	0	1	x
0	0	1	1	0	1	0	1	0	x	1	x	x	1	x	0
0	1	0	0	0	0	0	1	0	x	x	1	0	x	1	x
0	1	0	1	0	1	1	1	0	x	x	0	1	x	x	0
0	1	1	0	0	0	0	1	0	x	x	1	x	1	1	x
0	1	1	1	1	0	1	1	1	x	x	1	x	0	x	0
1	0	0	0	0	0	0	1	x	1	0	x	0	x	1	x
1	0	0	1	0	0	0	1	x	1	0	x	0	x	x	0
1	0	1	0	0	0	0	1	x	1	0	x	x	1	1	x
1	0	1	1	1	1	0	1	x	0	1	x	x	1	x	0
1	1	0	0	0	0	0	1	x	1	x	1	0	x	1	x
1	1	0	1	0	0	0	1	x	1	x	1	0	x	x	0
1	1	1	0	0	0	0	1	x	1	x	1	x	1	1	x
1	1	1	1	0	0	0	1	x	1	x	1	x	1	x	0



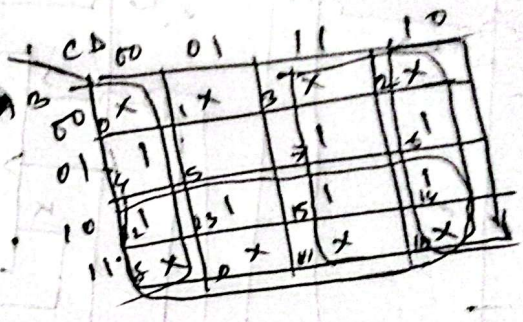
$J_A = BCD$



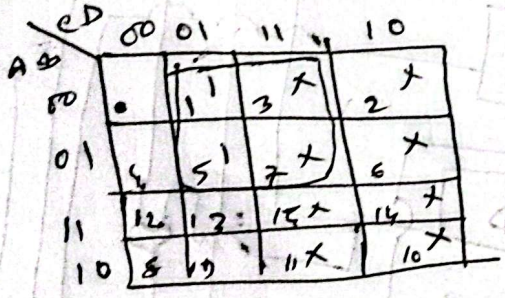
$K_A = A' + B + CD'$



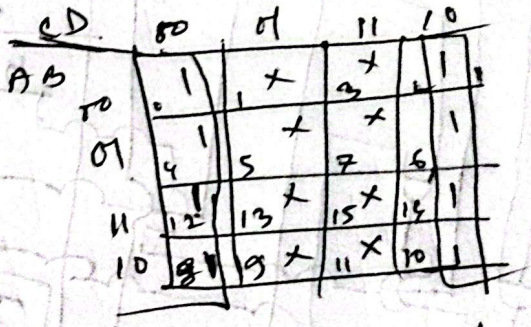
$J_B = CD$



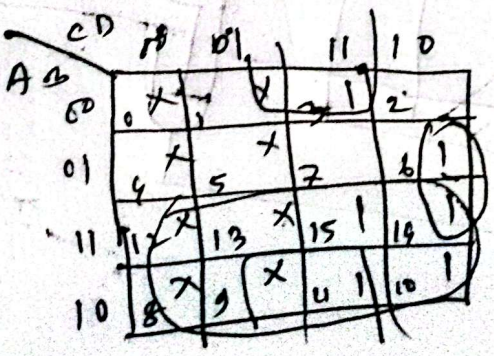
$K_B = A + D' + C$



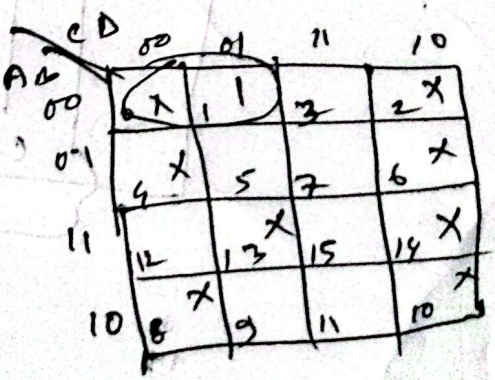
$J_C = A' + D$



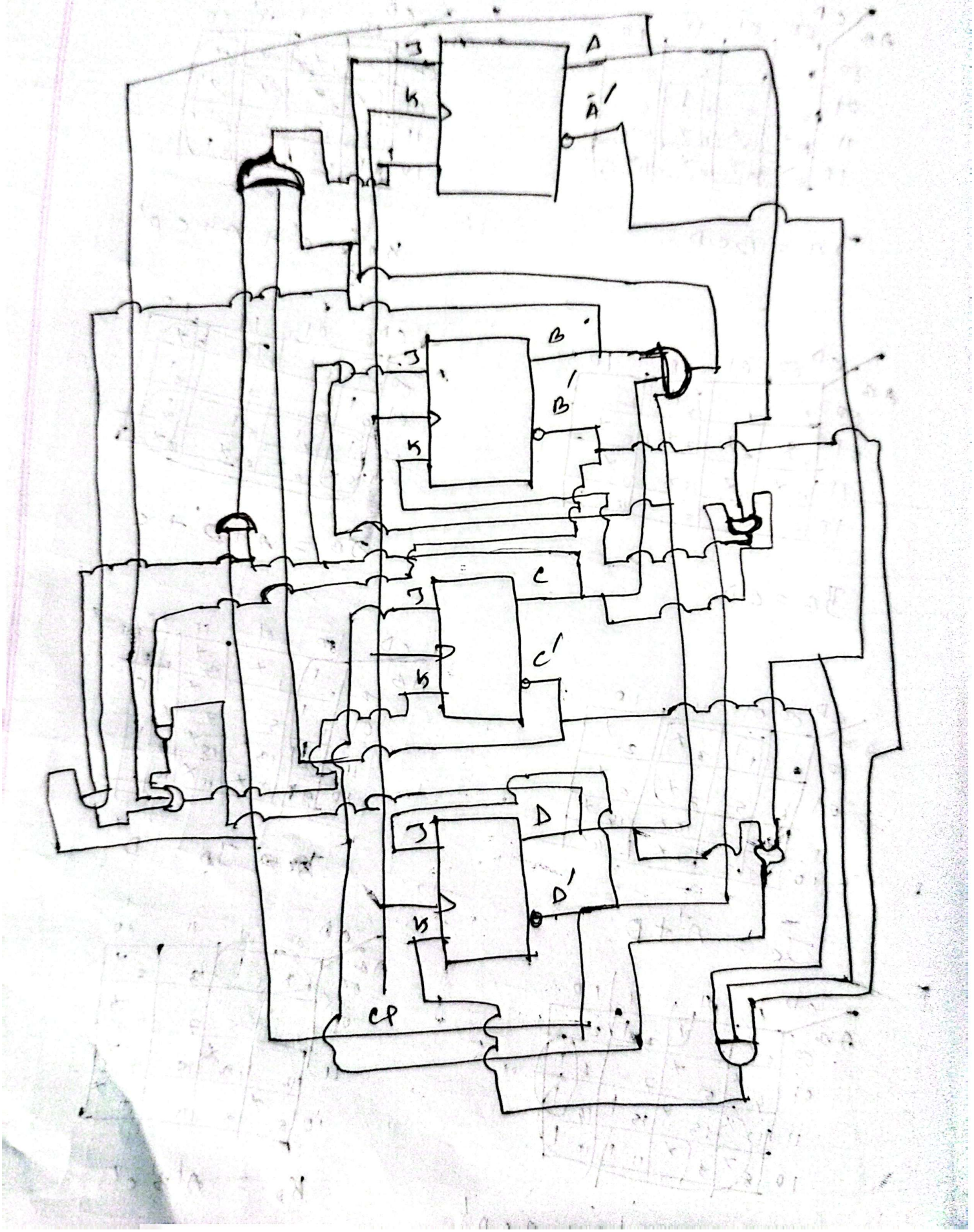
$J_D = D'$



$K_C = A + B'D + BCD'$



$K_D = A'B'C'$


J
K
A
A'
B
B'
C
C'
D
D'
CP