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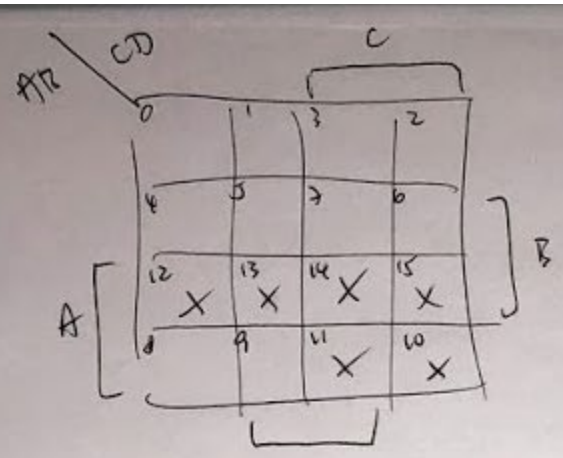
Lab 4

Part A

	BCD(8421)	OUTPUTS						
Dec.	ABCD	H	I	J	K	L	M	N
0	0000	1	1	1	1	1	1	0
1	0001	0	1	1	0	0	0	0
2	0010	1	1	0	1	1	0	1
3	0011	1	1	1	1	0	0	1
4	0100	0	1	1	0	0	1	1
5	0101	1	0	1	1	0	1	1
6	0110	1	0	1	1	1	1	1
7	0111	1	1	1	0	0	0	0
8	1000	1	1	1	1	1	1	1
9	1001	1	1	1	1	0	1	1
10	1010	x	x	x	x	x	x	x
11	1011	x	x	x	x	x	x	x
12	1100	x	x	x	x	x	x	x
13	1101	x	x	x	x	x	x	x
14	1110	x	x	x	x	x	x	x
15	1111	x	x	x	x	x	x	x

$$H = A'B'C'D' + A'B'CD' + A'B'CD + A'BC'D + A'BCD' + A'BCD + AB'C'D' + AB'C'D$$
$$I = A'B'C'D' + A'B'C'D + A'B'CD' + A'B'CD + A'BC'D' + A'BCD + AB'C'D' + AB'C'D$$
$$J = A'B'C'D' + A'B'C'D + A'B'CD + A'BC'D' + A'BC'D + A'BCD' + A'BCD + AB'C'D' + AB'C'D$$
$$K = A'B'C'D' + A'B'CD' + A'B'CD + A'BC'D + A'BCD' + AB'C'D' + AB'C'D$$
$$L = A'B'C'D' + A'B'CD' + A'BCD' + AB'C'D'$$
$$M = A'B'C'D' + A'BC'D' + A'BC'D + A'BCD' + AB'C'D' + AB'C'D$$
$$N = A'B'CD' + A'B'CD + A'BC'D' + A'BC'D + A'BCD' + AB'C'D' + AB'C'D$$



$X = \cancel{AB'CD'}$

ABCD

1010 = 10

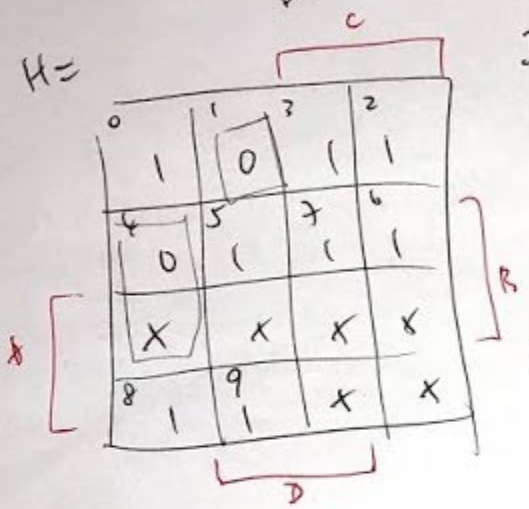
1011 = 11

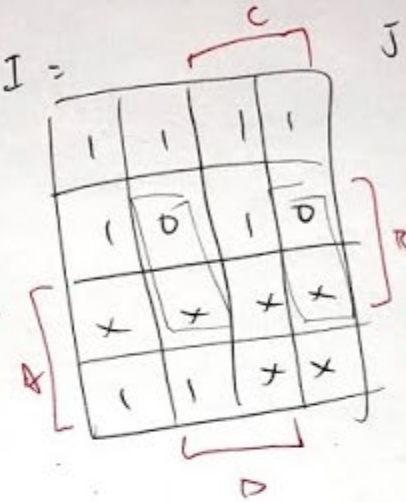
1100 = 12

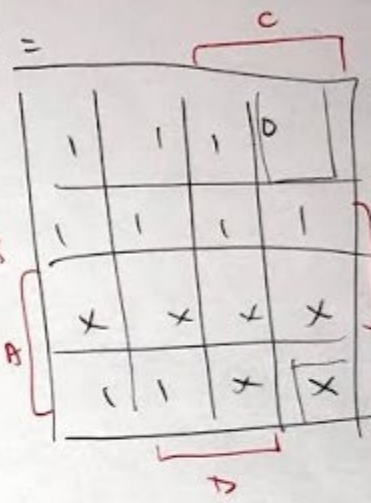
1101 = 13

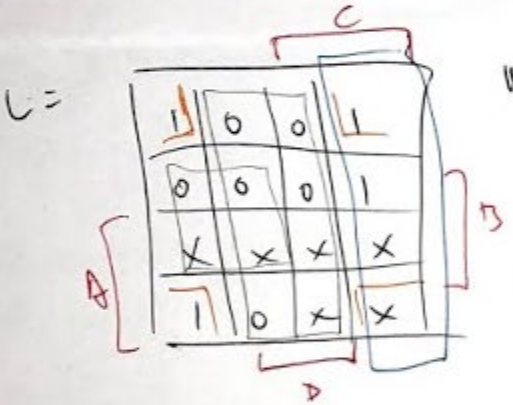
1110 = 15

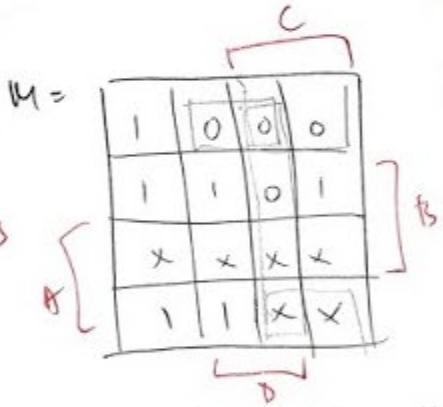
1111 = 14

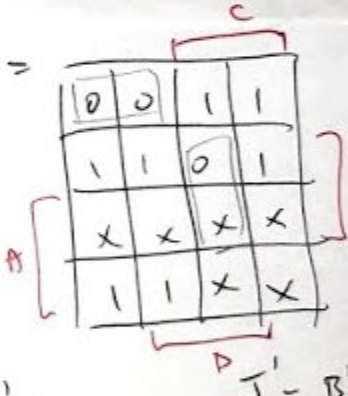












$H' = A'B'C'D + BC'D'$

$H = \cancel{(A'B'C'D)(BC'D')}$

$(H') = (A'B'C'D + BC'D')'$

$H = (\overline{A'B'C'D})(\overline{BC'D'})$

$= (A + B + C + D')(B' + C + D)$

$I' = BC'D + BCD'$

$(I') = (BC'D + BCD')'$

$= (\overline{BC'D})(\overline{BCD'})$

$= (B' + C + D')(B' + C' + D)$

$J' = B$

$(J') = (B'$

$J = B$

$L' = D + BC'$

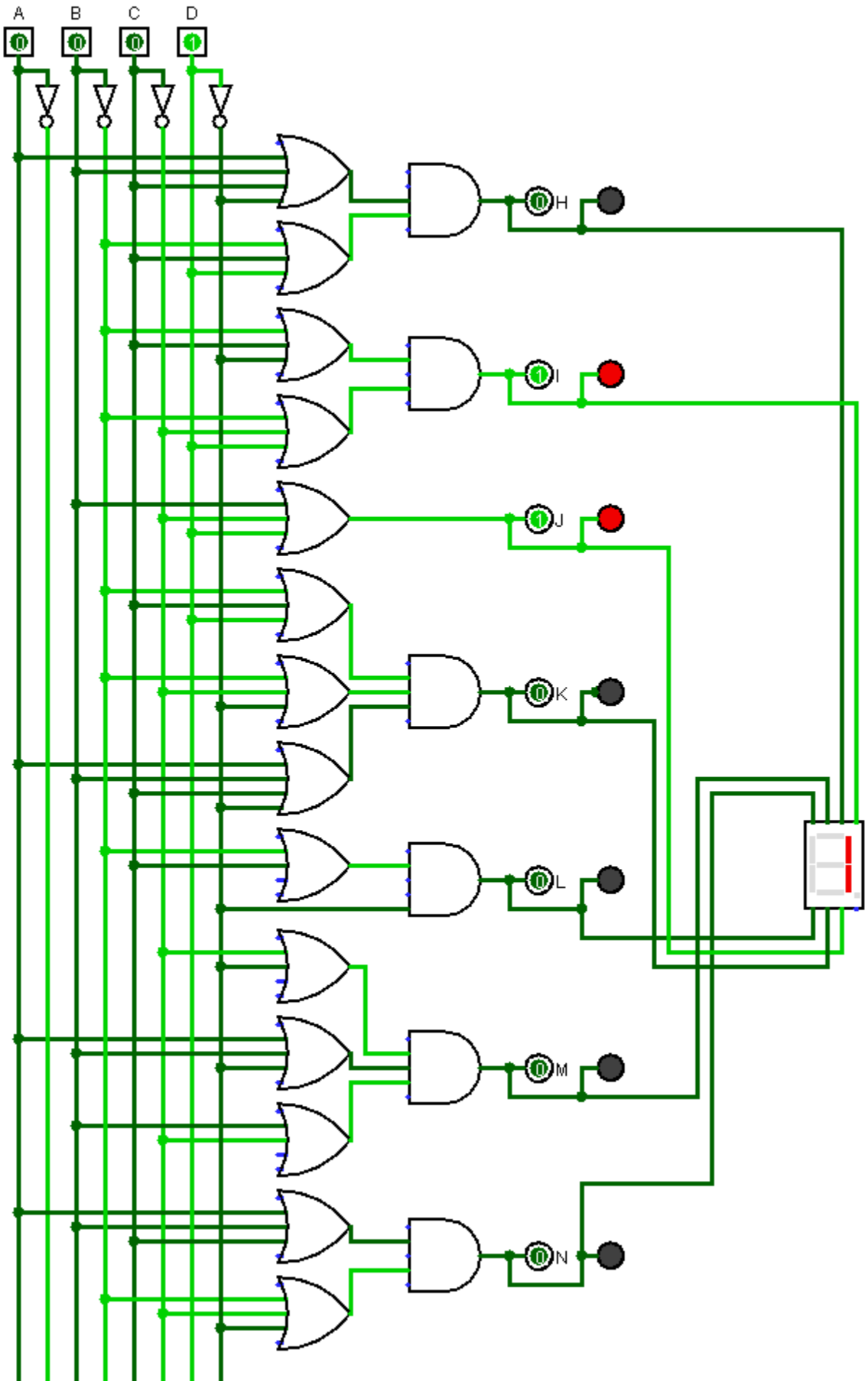
$L = (D)(BC')$

$M' = CD +$

$M = (\overline{CD}$

$$H = (A + B + C + D')(B' + C + D)$$
$$I = (B' + C + D')(B' + C' + D)$$
$$J = (B + C' + D)$$
$$K = (B' + C + D)(B' + C' + D')(A + B + C + D')$$
$$L = (D')(B' + C)$$
$$M = (C' + D')(A + B + D')(B + C')$$
$$N = (A + B + C)(B' + C' + D')$$

Using the above we've built BCD decoder and turn it into a component


A
B
C
D
0
0
0
1
0 H
1 I
1 J
0 K
0 L
0 M
0 N

Part B solution in Logism file.

Utilizing components *full adder* from lab 3, *BCD-decoder* from this lab Part A, *4bit-to-BCD converter*, the final circuit named *Part2-final*.