CSE 260

Assignment 3

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sec : 1

Ans to the qr no 1

Given, $f(A,B,C,D) = \Sigma(0,2,7,11,12,14) + d(3,4,5,6)$

Grouping based on the number of 1's in them,

Group A : {0000}

Group B : {0010, 0100}

Group C : {0011, 0101, 0110, 1100}

Group D : {0111, 1011, 1110}

	step 1	step 2	step 3
0	0000 ✓	(0,2) 00_0 ✓	(0,2,4,6) 0__0
		(0,4) 0_00 ✓	
2	0010 ✓	(2,3) 001_ ✓	(2,3,6,7) 0_1_
4	0100 ✓	(2,6) 0_10 ✓	(4,6,12,14) _1_0
		(4,5) 010_ ✓	(4,5,6,7) 01__
		(4,6) 01_0 ✓	
		(4,12) _100 ✓	
3	0011 ✓	(3,7) 0_11 ✓	
5	0101 ✓	(3,11) _011	
6	0110 ✓	(5,7) 01_1 ✓	
12	1100 ✓	(6,7) 011_ ✓	
		(6,14) _110 ✓	
		(12,14) 11_0 ✓	
7	0111 ✓		
11	1011 ✓		
14	1110 ✓		

Prime impliment chart from the table:

	ABCD	0	2	7	11	12	14
(3,11) -011	B'CD				(X)		
(0,2,4,6) 0--0	A'D'	(X)	X				
(2,3,6,7) 0-1-	A'C		X	X			
(4,6,12,14) -1-0	BD'					(X)	(X)
(4,5,6,7) 01--	A'B			X			

Ans in SOP = B'CD + A'D' + BD' + A'C

Ans to the qr no 2

Given, $F(A,B,C,D) = \Sigma(0,1,2,7,8,10,11,13,15)$

Grouping the minterms based on the number of 1's we get:

Group A : {0000}

Group B : {0001, 0010, 1000}

Group C : {1010}

Group D : {0111, 1011, 1101}

Group E : {1111}

Tabulation table for finding prime implecants is given below:

	step 1	step 2	step 3
0	0000 ✓	(0,1) 000 –	(0,2,8,10) – 0 – 0
		(0,2) 00 – 0 ✓	(0,8,2,10) – 0 – 0
		(0,8) – 000 ✓	
1	0001 ✓	(2,10) – 010 ✓	
2	0010 ✓	(8,10) 10 – 0 ✓	
8	1000 ✓		
10	1010 ✓	(10,11) 101 –	
7	0111 ✓	(7,15) – 111	
11	1011 ✓	(11,15) 1 – 11	
13	1101 ✓	(13,15) 11 – 1	
15	1111 ✓		

Prime implicant table :

	ABCD	0	1	2	7	8	10	11	13	15
(0,1) 000-	A'B'C'	X	(X)							
(10,11) 101-	A B'C						X	X		
(7,15) -111	BCD				(X)					X
(11,15) 1-11	ACD							X		X
(13,15) 11-1	ABD								(X)	X
(0,2,8,10) -0-0	B'D'	X		(X)		(X)	X			

Answer : A'B'C' + B'D' + BCD + ABD + AB'C

Answer to the qr no 3

Given condition for circuit,

output = 1 when $A-3 < B$

output = 0 when otherwise

Let, $A-3 = S$; output = $S_4 S_3 S_2 S_1$

Again, $A = A_4A_3A_2A_1$ and $B = B_4B_3B_2B_1$

$(3)_{10} = (0011)_2$ [$\because A_4, B_4$ are MSB]

After building $A-3=S$ substructon using 4 bit parallel adder, for comparing bits of B with S, we have to check which digits are equal and greater.

we know, $F(A=B) = A \odot B$

$F(A>B) = AB'$, here $F(B_i > S_i) = B_i S_i'$

$\therefore F(B_i = S_i) = B_i \odot S_i = x_i$; $i = 4,3,2,1$

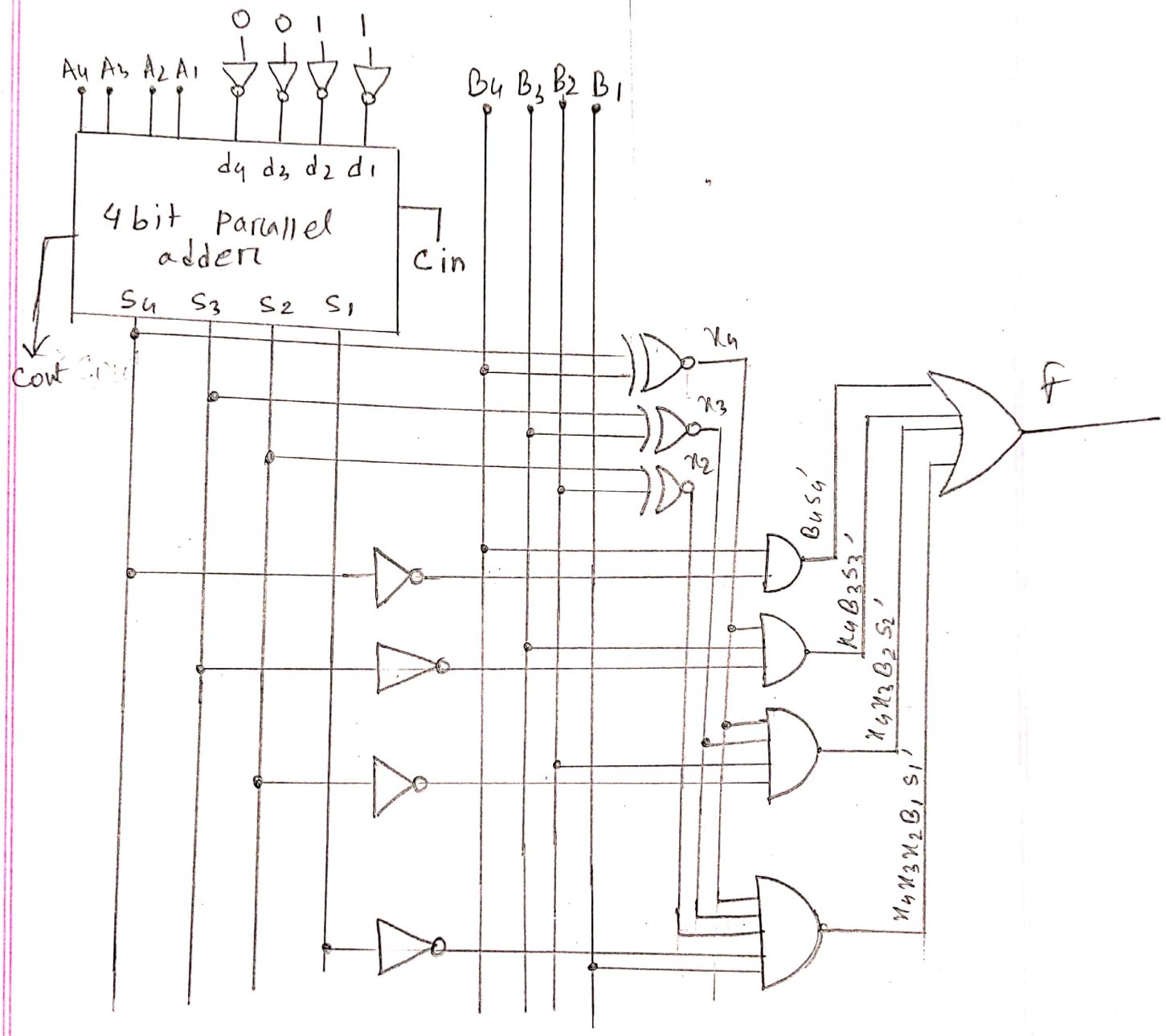
$\therefore F(B > S) = (B_4 > S_4) + (B_4 = S_4)(B_3 > S_3) +$

$(B_4 = S_4)(B_3 = S_3)(B_2 > S_2) + (B_4 = S_4)(B_3 = S_3)(B_2 = S_2)(B_1 > S_1)$

$\therefore$ condition for $B > A-3$ will be,

$F(B > A-3) = B_4 S_4' + x_4 B_3 S_3' + x_4 x_3 B_2 S_2' +$

$x_4 x_3 x_2 B_1 S_1'$

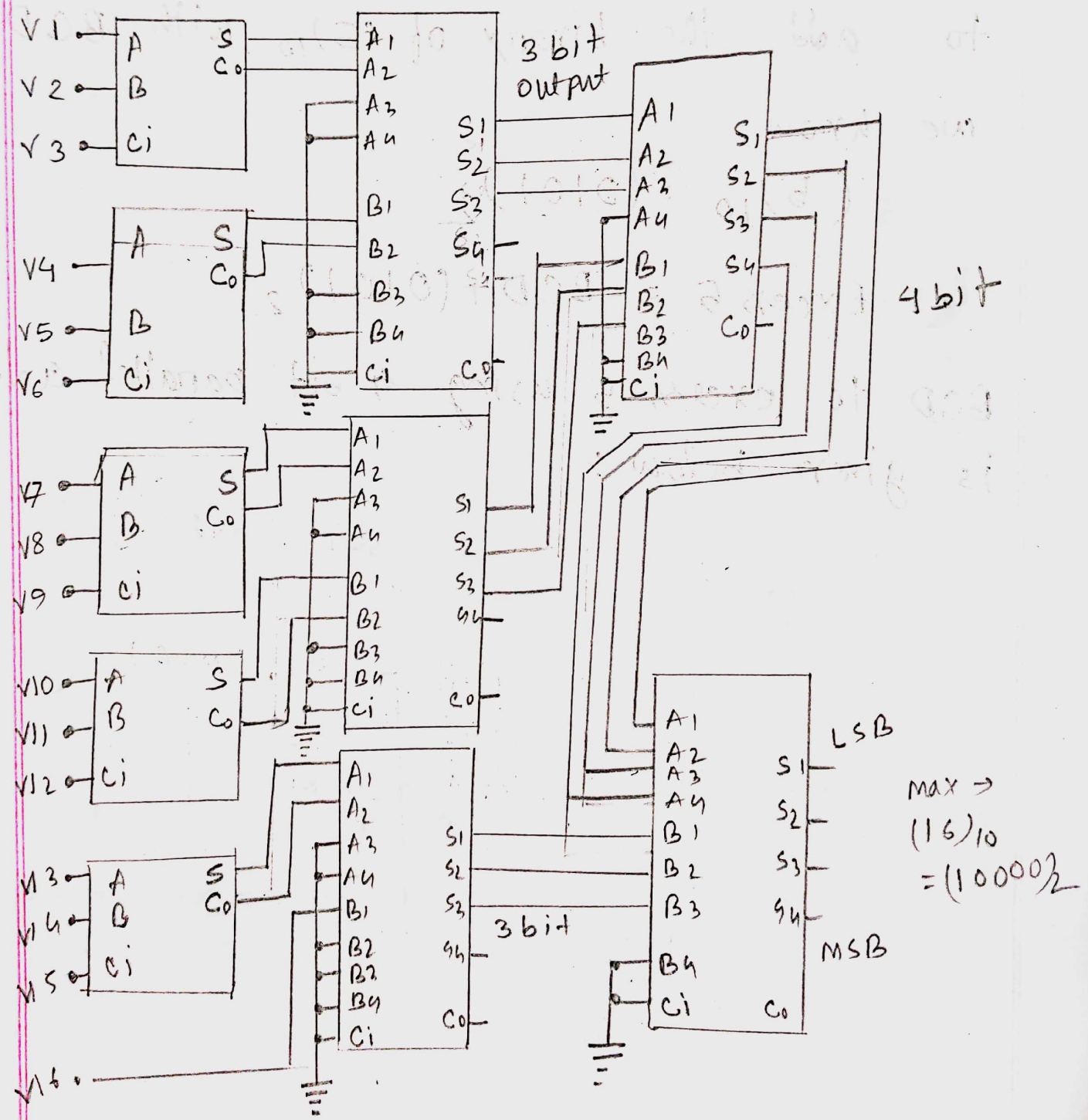


Hence,

$$f = B_4S_4' + x_4B_3S_3' + x_4x_3B_2S_2' + x_4x_3x_2B_1S_1'$$

Ans to the or no 4

16 people votete system using parallel adders:



Ans to the or no 5

To get from BCD to Excess 5, we have to add the binary of $(5)_{10}$ with BCD number.

we know,

$$(5)_{10} = (0101)_2$$

$\therefore$ Excess 5 = BCD + $(0101)_2$

BCD to excess 5 using 4 bit parallel adder is given below: