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Group A

Assignment 3

Title : BCD Adder

Problem statement : Design and realization of BCD adder using 4-Bit Binary Adder (IC 7483)

Hardware and Software requirements :

Theory :

→ What is BCD Adder?

• The 4 bit binary adder IC 7483 can be used to perform addition of BCD numbers.

→ BCD addition rules:

i) Rule 1 :

Sum ≤ 9, carry = 0

eg: 3+6

	0'	0'	1	1
3				
+ 6	0	1	1	0
	1	0	0	1
	+ 0	0	0	0
	1	0	0	1

ii) Rule 2 :

Sum > 9, carry = 0

Eg: 6+8

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```
  6      0     1 1  0
+ 8      1     0 0  0
        1 1    1 1  0
       + 0     1 1  0   → adding 6
       1 0     1 0  0
```

(iii) Rule 3:

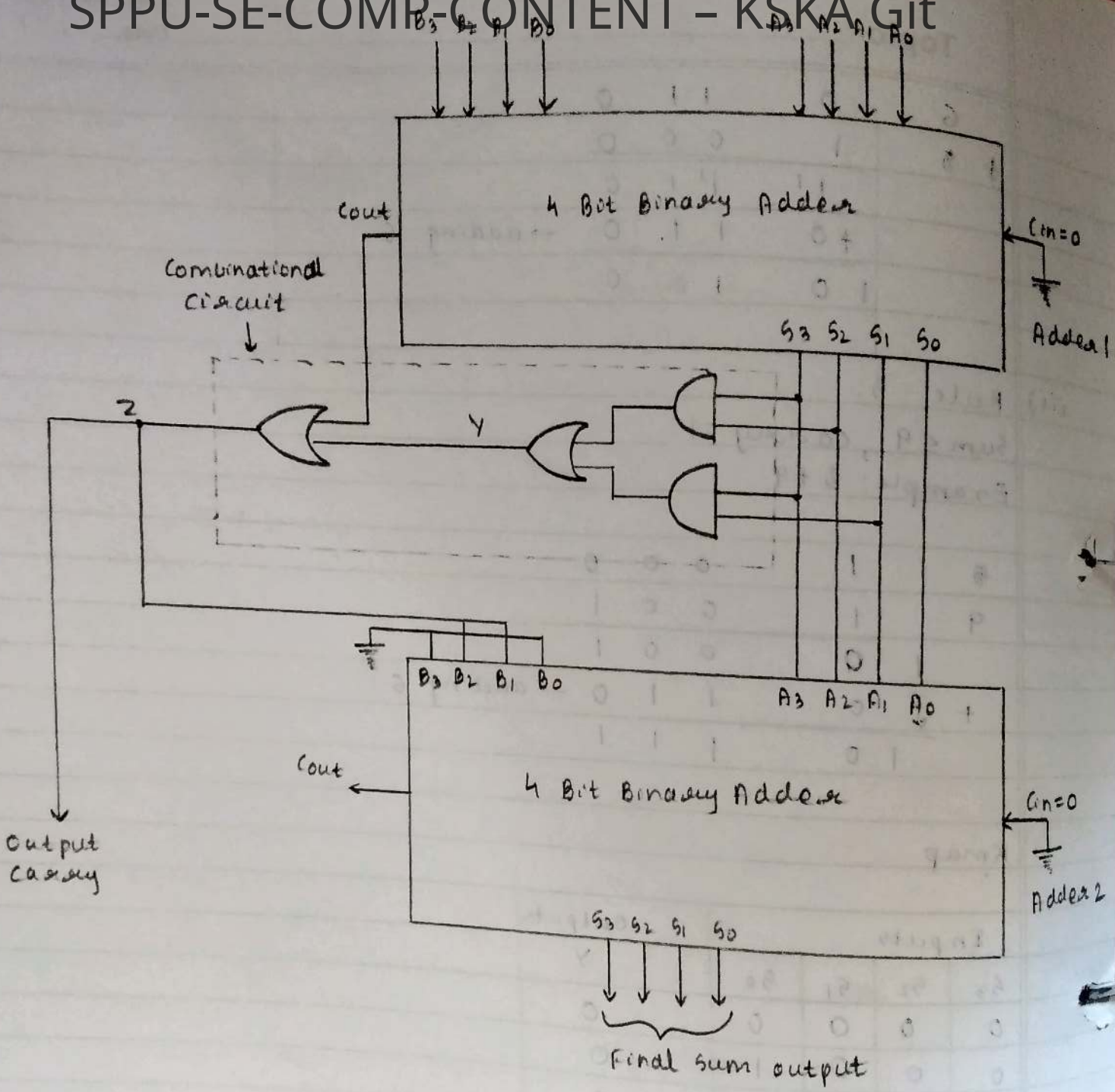
Sum ≤ 9, carry = 1

Example: 8 + 9

```
  8      1     0 0  0
  9      1     0 0  1
      1  0     0 0  1
  +   ↓  0     1 1  0   → adding 6
      1  0     1 1  1
```

→ Kmap

Inputs				Outputs
S_3	S_2	S_1	S_0	Y
0	0	0	0	0
0	0	0	1	0
0	0	1	0	0
0	0	1	1	0
0	1	0	0	0
0	1	0	1	0
0	1	1	0	0
0	1	1	1	0
1	0	0	0	0
1	0	0	1	0
1	0	1	0	1
1	0	1	1	1



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1	1	0	0	1
1	1	0	1	1
1	1	1	0	1
1	1	1	1	1

Y	$\bar{S_1}\bar{S_0}$	$\bar{S_1}S_0$	S_1S_0	$S_1\bar{S_0}$
$\bar{S_3}\bar{S_2}$	0 (0)	0 (1)	0 (3)	0 (2)
$\bar{S_3}S_2$	0 (4)	0 (5)	0 (7)	0 (6)
S_3S_2	1 (12)	1 (13)	1 (15)	1 (14)
$S_3\bar{S_2}$	0 (8)	0 (9)	1 (11)	1 (10)

$Y = S_3S_2 + S_3S_1$

→ Applications

- It is used widely in the computers and calculators.
- Used in arithmatic logic unit.
- It accepts the binary coded form of decimal numbers
- In applications where microcontrollers need to handle decimal arithmetic, BCD adders can be implemented to perform calculations accurately.
- It is used on digital clocks, electronic meters or any system that directly displays decimal values.

→ Conclusion:

- We have designed and realized BCD adder using 4-bit Binary Adder (IC 7483)