COMBINATIONAL LOGIC CIRCUITS

| NAME	USN
Kaushik K C	1DS22EC098
Manish S	1DS22EC120
K Ravishankar	1DS23EC413

INTRODUCTION:

- A combinational logic circuit is one in which the present state of the combination of the logic inputs decides the output .

- The term combination logic means combining of two or more logic gates to form a required function where the output at a given time depends only on the input.

BLOCK DIAGRAM:
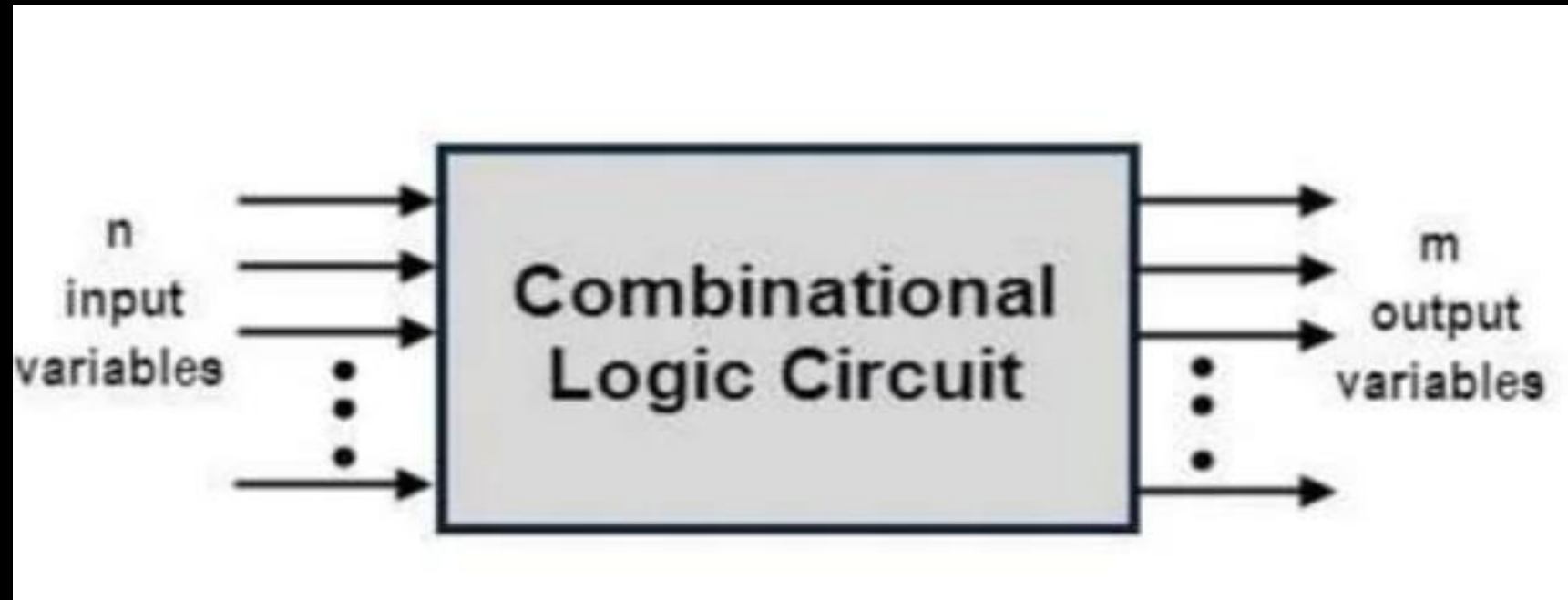
CLASSIFICATION OF COMBINATIONAL LOGIC
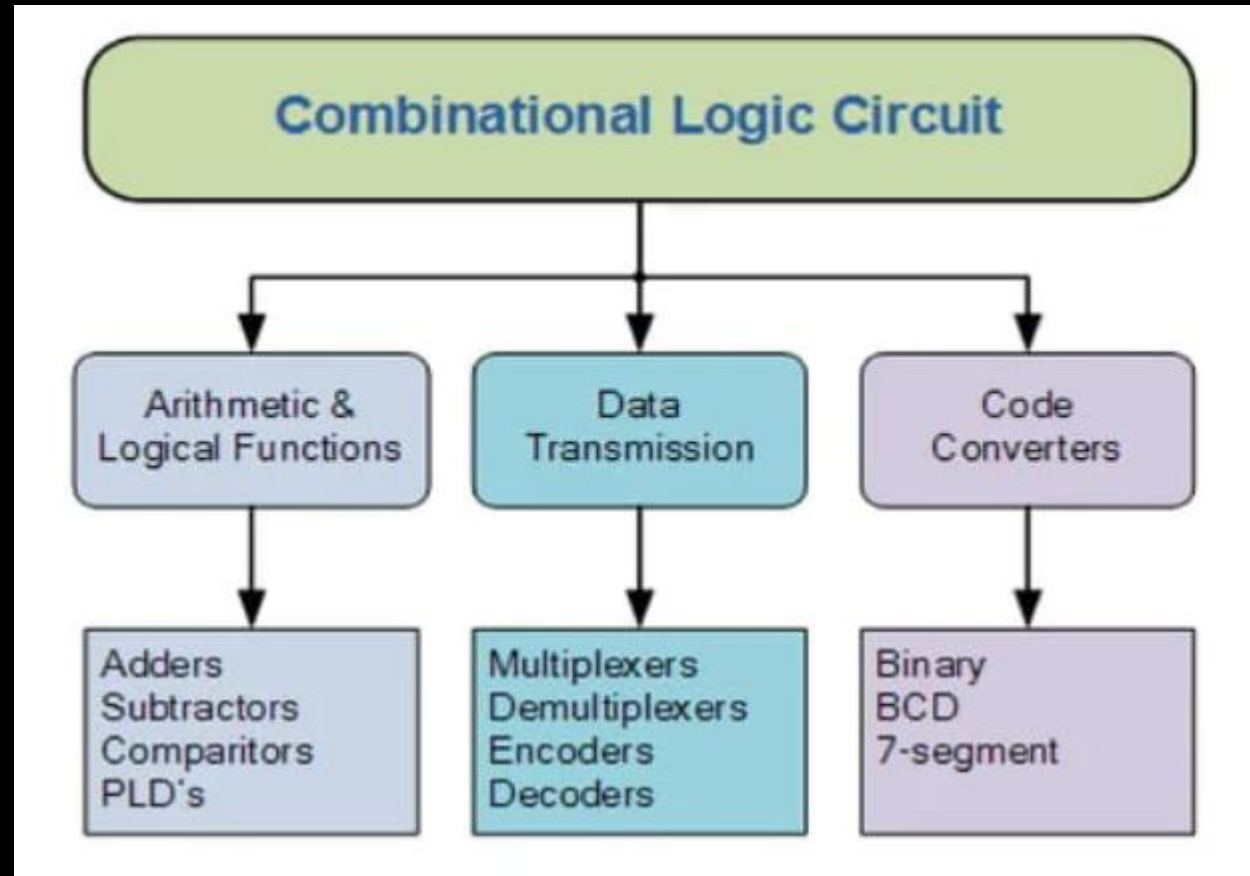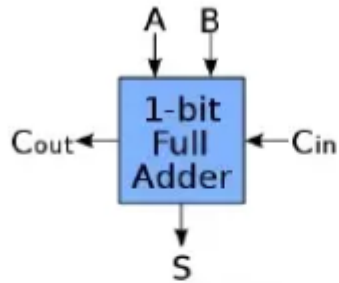
ADDERS

Logic circuit which performs the addition of binary numbers

Adders of two types:

      1. Half Adder (H.A)

      2. Full Adder (F.A)

FULL ADDER

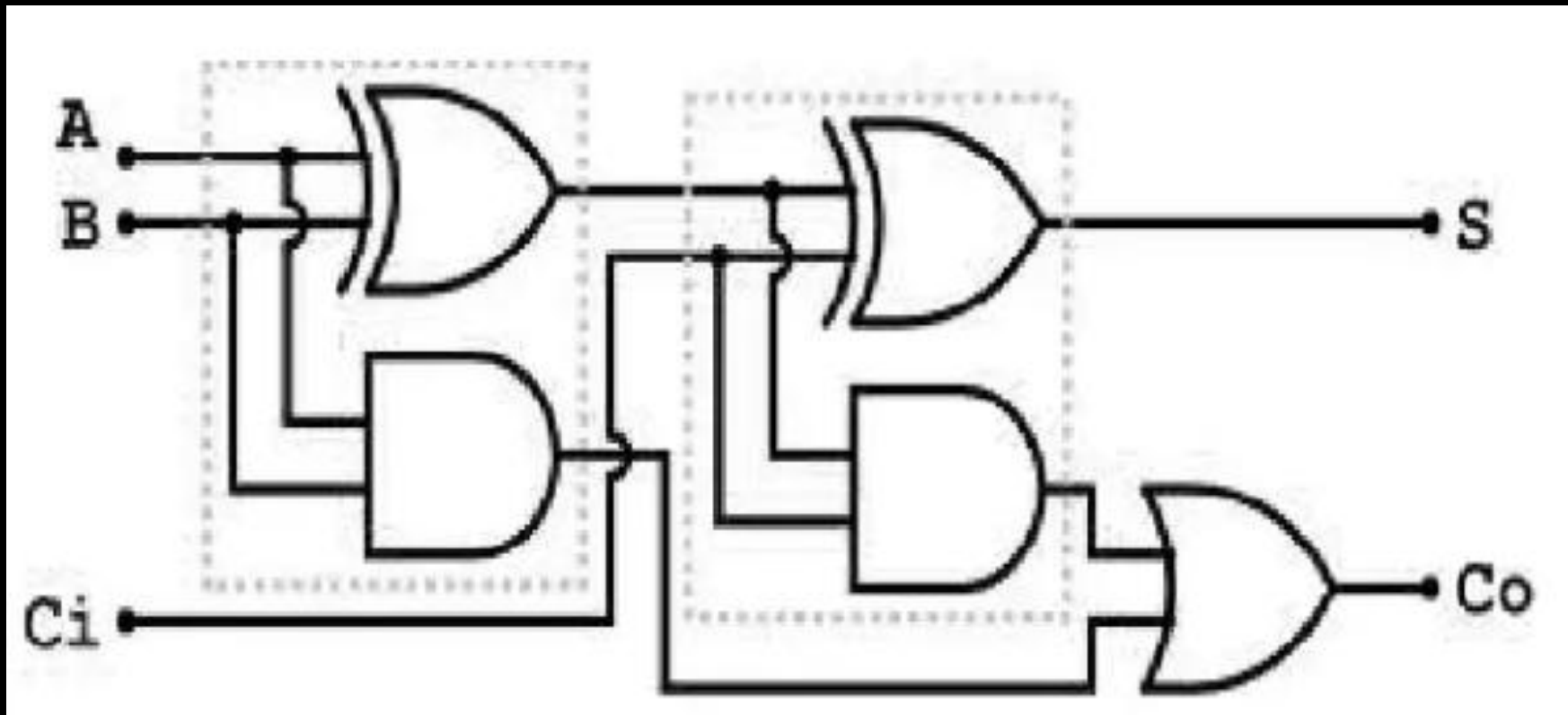It is a combinational logic circuit which performs addition of three binary inputs.

Inputs			Outputs	
X	Y	Carry In	Sum	Carry Out
0	0	0	0	0
0	0	1	1	0
0	1	0	1	0
0	1	1	0	1
1	0	0	1	0
1	0	1	0	1
1	1	0	0	1
1	1	1	1	1

$$S = \overline{A}\,\overline{B}C_{in} + \overline{A}B\overline{C}_{in} + A\overline{B}\,\overline{C}_{in} + ABC_{in}$$

$$= \overline{A}(\overline{B}C_{in} + B\overline{C}_{in}) + A(\overline{B}\,\overline{C}_{in} + BC_{in})$$

$$= \overline{A}(B \oplus C_{in}) + A(\overline{B \oplus C_{in}})$$

$$= A \oplus B \oplus C_{in}$$

$$C_{out} = \overline{A}BC_{in} + A\overline{B}C_{in} + AB\overline{C}_{in} + ABC_{in}$$

$$= C_{in}(\overline{A}B + A\overline{B}) + AB(\overline{C}_{in} + C_{in})$$

$$= C_{in}(A \oplus B) + AB$$

CIRCUIT DIAGRAM:

CHARACTERSTICS:

- The output of combinational circuit at any instant of time, depends only on the levels present at input terminals.
- The combinational circuit do not use any memory. The previous state of input does not have any effect on the present state of the circuit.
- A combinational circuit can have an n number of inputs and m number of outputs.

ADVANTAGES AND DISADVANTAGES

Advantage:

- Reduced Propagation Time(Delay)
- Fastest Addition logic

Disadvantage:

- CLA is that the carry logic block gets very complicated for more than 4 -bits

  (CLAs are usually implemented as 4-bit modules and are used in a hierarchical structure to realize adders that have multiples of 4-bits)

APPLICATION

Digital electronics form an integral part of the electronics system. Dealing with this digital data involves performing operations like addition, subtraction, and modulation on digital data. One such operation i.e. addition is performed on digital data using a full adder which will be discussed in this article.

We will discuss the full adder applications and the working Principle of full adder. Later we will discuss the advantages and disadvantages of full adder. The article will conclude with some insights on future trends of full adder. In case of any doubt, Readers are advised to go through the frequently asked questions.

CONCLUSION

The objectives of this experiment were effectively presented by building and testing half-adder circuit and full-adder circuits, half-subtracter and full-subtracter circuits and obtaining the truth table for each circuit stated above.

An Adder is a device that can add two binary digits. It is a type of digital circuit that performs the operation of additions of two numbers. It is mainly designed for the addition of binary number, but they can be used in various other applications. There are two types of Adder. One is Half Adder, and another one is known as Full Adder.

THANK YOU