Sub: "Digital Techniques"

HALF ADDER

A

Micro Project

Submitted by

msbtediplomahelp.blogspot.com

In Partial Fulfilment of

Diploma in Computer Engineering.

Department of Computer Engineering.

Institute of Civil and Rural Engineering, Gargoti.

(Govt-Aided)

(2020-21)

CERTIFICATE

This is to certify that the Micro Project entitled **"Half Adder of subject digital**

Technique" submitted to the **Institute of Civil and Rural Engineering, Gargoti**, in partial fulfilment of **Diploma in Computer Engineering**

is a record of original work done by

during the period from **August 2020 to January 2021** under my supervision and

guidance and it has not copied or submitted with other similar title by any

candidate in any Diploma College.

Head of the Department.   **Signature of the guide**

DECLARATION

We here by declare that the

Micro Project entitled **"HALF ADDER"** submitted to the

Institute of Civil and Rural Engineering, Gargoti, in partial fulfillment of

Diploma in Computer Engineering and Micro Project done by us during

the period, from August 2020 to January 2021 under the supervision and

guidance of Mr.D. K. Shanediwan(Sir), Lecturer, Department of Computer

Engineering, and it has not copied or submitted with other similar title

by any candidate in any Diploma College.

Place: Gargoti.   Signature of the Candidate

Date:

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Team Members:

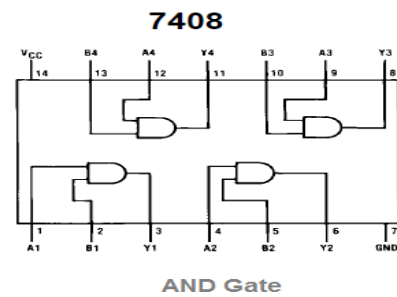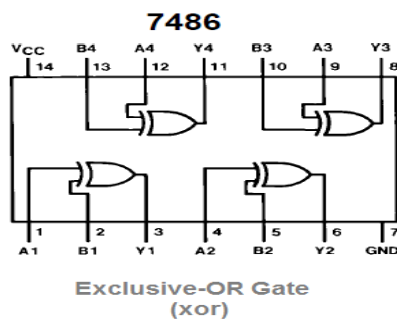| Roll.No.	Name	Signature
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Title of micro project:

HALF ADDER

INTRODUCTION:

An adder is a digital logic circuit in electronics that is extensively used for the addition of numbers. In many computers and other types of processors, adders are even used to calculate addresses and related activities and calculate table indices in the ALU and even utilized in other parts of the processors. These can be built for many numerical representations like excess-3 or binary coded decimal. Adders are basically classified into two types: Half Adder and Full Adder.

An **adder** is a digital circuit that performs **addition** of numbers. In many **computers** and other kinds of **processors** adders are used in the **arithmetic logic units** or **ALU**. They are also used in other parts of the processor, where they are used to calculate **addresses**, table indices, **increment and decrement operators** and similar operations.

Although adders can be constructed for many **number representations**, such as **binary-coded decimal** or **excess-3**, the most common adders operate on **binary numbers**. In cases where **two's complement** or **ones' complement** is being used to represent **negative numbers**, it is trivial to modify an adder into an **adder–subtractor**. Other **signed number representations** require more logic around the basic adder.
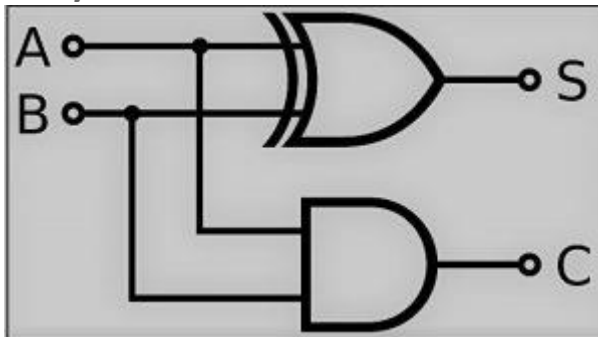
❖ Pin Configuration of IC 7400:

7486

Vcc	B4	A4	Y4	B3	A3	Y3
14	13	12	11	10	9	8

1	2	3	4	5	6	7
A1	B1	Y1	A2	B2	Y2	GND

Exclusive-OR Gate
(xor)

7408

Vcc	B4	A4	Y4	B3	A3	Y3
14	13	12	11	10	9	8

1	2	3	4	5	6	7
A1	B1	Y1	A2	B2	Y2	GND

AND Gate

0.4 Logic diagram of NAND gate

Sum= A XOR B
Carry = A AND B

Half Adder Logical Diagram

0.5 Truth table

Half Adder

INPUTS		OUTPUTS	
A	B	SUM	CARRY
0	0	0	0
0	1	1	0
1	0	1	0
1	1	0	1

The half adder K-map is

HA K-Map
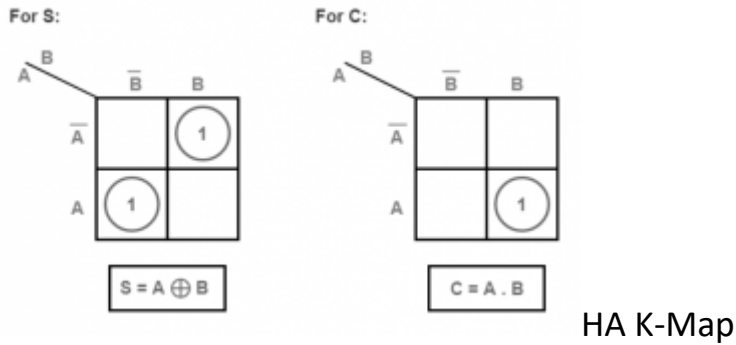
Half Adder Limitations

The main reason to call these binary adders like Half Adders is, that there is no range to include the carry bit using an earlier bit. So, this is a main limitation of HAs once used like binary adder particularly in real-time situations which involve adding several bits. So this limitation can be overcome by using the full adders.

0.6 Components:-

       1.General purpose PCB

       2. 14 pin IC socket

       3.7400 IC

       4.Connecting Wires

       5.Resistor

       6.LED

Resources Required:

Sr.No.	Name of Resource Used	Specification	Quantity
1	Digital Multimeter	3 ½ digital display	1
2	IC Tester	Digital	1
3	Breadboard	5.5 cm * 17 cm	1
4	DC power supply	+5 V	1
5	IC	7400	1
6	Resistors	330 ohm	2
7	Connecting wires	Single strand 0.6mm	As per required
8.	LED	Red/yellow color	2

Applications:

The applications of this basic adder are as follows

- To perform additions on binary bits the Arithmetic and Logic Unit present in the computer prefers this adder circuit.
- The combination of half adder circuits leads to the formation of the Full Adder circuit.
- These logic circuits are preferred in the design of calculators.
- To calculate the addresses and tables these circuits are preferred.
- Instead of only addition, these circuits are capable of handling various applications in digital circuits. Further, this becomes the heart of digital electronics.

Advantages:

1. Simple design, basic building block to understand 1 bit addition.
2. Just with inverter it can be converted to Half subtractor.

Disadvantages:

1. It does not incorporate (or take care of) previous carry for addition.
2. Hence it is not suitable for cascading for multi-bit addition.
3. To get rid of this problem, Full adder is required which adds three 1 bit.