# EXPERIMENT NO.: - 3(A)

**AIM:** To study the arithmetic function of addition by building Half Adder circuit using logic gates.

**THEORY:**

This experiment gives how computer does the function of addition. The addition of two numbers in binary which does no have “carry” is done by half adder circuit and the addition of two numbers in binary which have “carry” is done by full adder circuit.

The half adder adds two-binary digit at a time. Fig. given below shows how to make half adder by using two logic gates namely AND gate and EX-OR gate. The truth table of EX-OR gate is as below:

**EX-OR Gate:**

|  |  |  |
| --- | --- | --- |
| **A** | B | OUTPUT |
| 0 | 0 | 0 |
| 0 | 1 | 1 |
| 1 | 0 | 1 |
| 1 | 1 | 0 |

As shown in the following figure the output of AND gate is used as “carry” bit and the output of EX-OR gate is used as “sum” bit. There will be four distinct cases which are shown in following truth table.



**EQUIPMENT REQUIRED:**

-Trainer kit

**COMPONENTS REQUIRED:**

**-**ICs 7486, 7408.

**-**Hook up wires.

**PROCEDURE:**

1. Connect 5V DC power supply to input terminals.
2. Change the state of A & B (0 & 1) to get four states at output by changing the position of micro switch. Check the truth table of half adder. ( If LED glows it is High state and if it does not glow then it is Low state)

**OBSERVATIONS:**

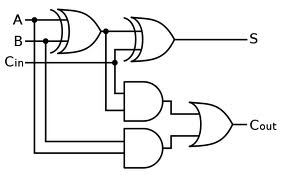
**CONCLUSION:**

# EXPERIMENT NO.: - 3(B)

**AIM:** To study the arithmetic function of addition by building Full Adder circuit using logic gates.

**THEORY:**

This experiment gives how computer does the function of addition. The addition of two numbers in binary which does no have “carry” is done by half adder circuit and the addition of two numbers in binary which have “carry” is done by full adder circuit. Sometimes in addition of two binary numbers you may have a carry from one column to the next. So in the next column we have to add three digits. This is not possible by half adder circuit. This is carried by a circuit as shown in fig.1 which consists of two half adder circuits and an OR-gate. This is known as full adder circuit.



As shown in figure.1 the output of AND gate is used at “carry” bit and the output of EX-OR gate is used as “sum” bit. There will be four distinct cases which are shown in following truth table.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **A** | **B** | **Cin** | **CARRY(Cout)** | **SUM** |
| 0 | 0 | 0 | 0 | 0 |
| 0 | 0 | 1 | 0 | 1 |
| 0 | 1 | 0 | 0 | 1 |
| 0 | 1 | 1 | 1 | 0 |
| 1 | 0 | 0 | 0 | 1 |
| 1 | 0 | 1 | 1 | 0 |
| 1 | 1 | 0 | 1 | 0 |
| 1 | 1 | 1 | 1 | 1 |

**EQUIPMENT REQUIRED:**

-Trainer kit

**COMPONENTS REQUIRED:**

**-**ICs 7408, 7432, 7486.

**-**Hook up wires.

**PROCEDURE:**

1. Connect 5V DC power supply to input terminals.
2. Change the state of A & B (0 & 1) to get four states at output by changing the position of micro switch. Check the truth table of half adder. ( If LED glows it is High state and if it does not glow then it is Low state)

**OBSERVATIONS:**

**CONCLUSION:**