# Digital Logic Design

# Experiment 3: Adder and Subtractor

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**Name: ……………………………. Registration No: ……………………**

**Date: …………………………… Grade and Signature: ………………………**

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**Objectives:** To study the Half & Full Adder and Half & Full Subtrator and 4 bit adder & subtractor can be constructed.

**THEORY:** A digital adder circuit adds binary signals & a subtractor subtracts binary signals.

Half Adder/Subtractor is a basic circuits that adds / subtracts 2 bits and generates sum or difference along with Carry / Borrow.

Full adder/ subtractor has the provision to take into consideration of any previous carry / borrow so joining these leads to 4-bit or more bits adder and subtractor.

**Equipment required:**

Power Supply, Connecting wires, ICs 7486, 7432, 7408, 7404 and DLD Trainer

1. **Half Adder**

**Circuit Diagrams**



**Truth Table**

|  |  |  |  |
| --- | --- | --- | --- |
| **Input A** | **Input B** | **Sum =** | **Carry =** |
| **0** | **0** |  |  |
| **0** | **1** |  |  |
| **1** | **0** |  |  |
| **1** | **1** |  |  |

**Procedure:**

1. **Write** the output of each gate on diagram to understand the expected output.
2. **Simulate** this circuit in Multisim software.
3. **Implement** the circuit.
4. **Record** the inputs, outputs and formulas in truth table.
5. **Repeat** this procedure for all given circuits below.
6. **Full Adder**

**Circuit Diagrams**



**Truth Table**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **A** | **B** | **C** | **Sum =** | **Carry =** |
|  |  | **0** |  |  |
|  |  | **1** |  |  |
|  |  | **0** |  |  |
|  |  | **1** |  |  |
|  |  | **0** |  |  |
|  |  | **1** |  |  |
|  |  | **0** |  |  |
|  |  | **1** |  |  |

1. **Half Subtractor**

**Circuit Diagrams**



**Truth Table**

|  |  |  |  |
| --- | --- | --- | --- |
| **Input A** | **Input B** | **Diff. =** | **Borrow =** |
| **0** | **0** |  |  |
| **0** | **1** |  |  |
| **1** | **0** |  |  |
| **1** | **1** |  |  |

1. **Full Subtractor**

**Circuit Diagrams**



**Truth Table**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **A** | **B** | **C** | **Diff. =** | **Bout =** |
|  |  | **0** |  |  |
|  |  | **1** |  |  |
|  |  | **0** |  |  |
|  |  | **1** |  |  |
|  |  | **0** |  |  |
|  |  | **1** |  |  |
|  |  | **0** |  |  |
|  |  | **1** |  |  |

1. **Task: Draw and simulate the 4-bit Adder and subtarctor circuit using Full Adder and subtrator respectively.**