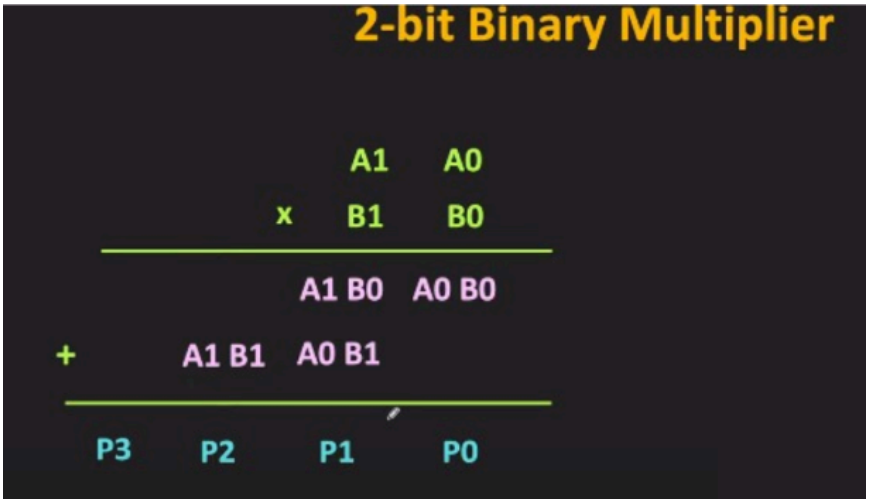
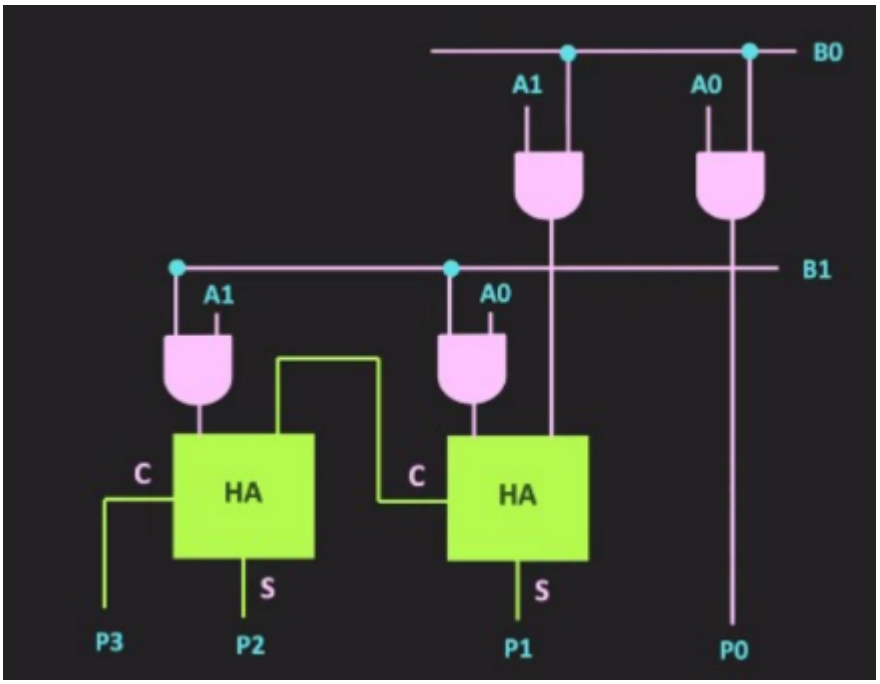
Activity 8

Aim Implement Multiplier Design

Theory A a multiplexer (MUX) is a combinational circuit used to select one of many input signals and forward the selected input to a single output line. It operates based on control (selection) lines, with each combination of selection lines determining which input is passed to the output. The number of selection lines is determined by the number of inputs, with the number of selection lines being log2N\log_2 Nlog2N for N inputs. A multiplexer can be constructed using logic gates like AND, OR, and NOT gates. It is widely used in various applications, including data routing, signal multiplexing, and implementing conditional logic. The multiplexer's role in digital systems is crucial for optimizing data flow and reducing the number of required components.

Circuit Diagram

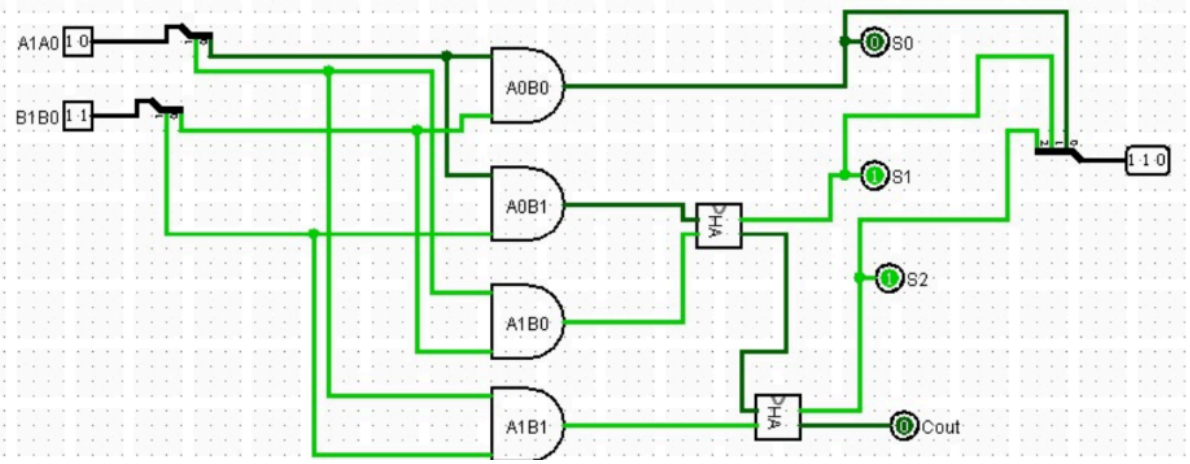




Truth Table

A_2	A_1	B_1	B_0	S_2	S_1	S_0	C_{out}
0	0	0	0	0	0	0	0
0	0	0	1	0	0	0	0
0	0	1	0	0	0	0	0
0	0	1	1	0	0	0	0
0	1	0	0	0	0	0	0
0	1	0	1	0	0	1	0
0	1	1	0	0	1	0	0
0	1	1	1	0	1	1	0
1	0	0	0	0	0	0	0
1	0	0	1	0	1	0	0
1	0	1	0	0	1	0	0
1	0	1	1	1	0	0	0
1	1	0	0	0	0	0	0
1	1	0	1	0	1	1	0
1	1	1	0	1	0	1	0
1	1	1	1	1	1	0	1

Simulation Result



LEARNING OUTCOME

Through this experiment, I understood the principles of binary multiplication and the application of logic gates in circuit design. I learned how to construct a simple binary multiplier circuit using AND gates and half adders, and how to produce the final product in binary form. This knowledge enhances my understanding of digital electronics and computer engineering.