Ahsanullah University of Science & Technology

Department of Computer Science & Engineering.

Course No : CSE 3110

Course Title : Digital System Design Lab.

Assignment No: 02.

Submitted By -

Section - C

Lab Group - C_1

Group - 07

ID - 18.01.04.103

18.01.04.104

18.01.04.117

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Introduction :

Booth's multiplication algorithm is a multiplication algorithm that multiplies two signed binary numbers in two's complement form. The algorithm was invented by Andrew Donald Booth in 1950. Booth's algorithm can be implemented by repeatedly adding (with ordinary unsigned binary addition) one of two predetermined values A and S to a product P, then performing a rightward arithmatic shift on P.

Problem Statement:

Design a 5 x 5 booth multiplier.

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Equipment and Budget :

Equipment	Estimated Cost (per Unit) Taka.
7408 (AND Gate)	80
7432 (OR Gate)	40
7486 (X-OR Gate)	50
7483 (Parallel Adder)	160
7474 (D-Flip Flop)	150
74273 (D-FlipFlop Array)	30
Bread Board	480
Jumper wire	150
Total cost	1140

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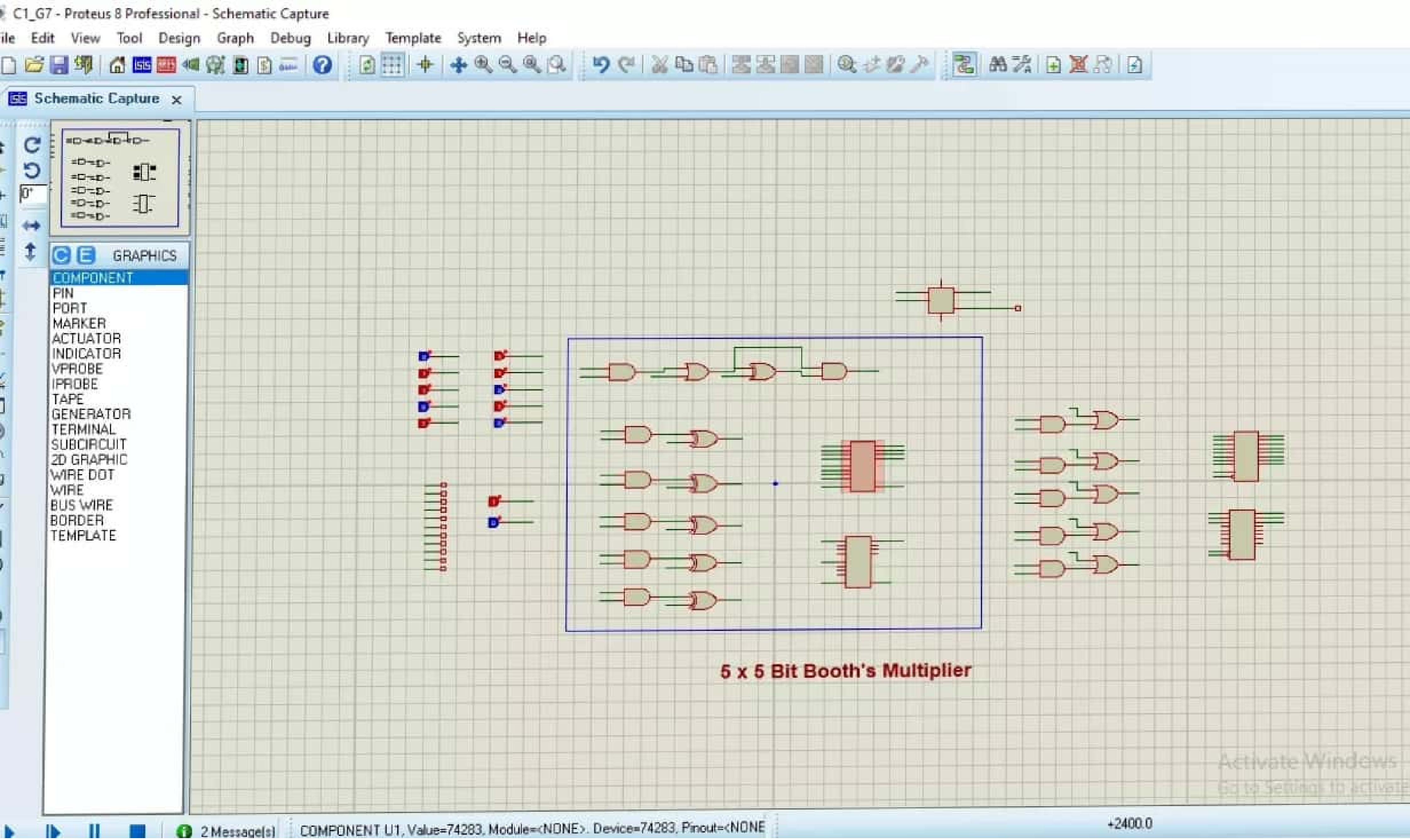

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Result :

Example : Find 13 × (−6) using booth's algorithm.

Here, multiplicant , m = 13 = 01101

multiplier , r = −6 = 11010

∴ A = 0 1 1 0 1 0 0 0 0 0 0

S = 1 0 0 1 1 0 0 0 0 0 0

P = 0 0 0 0 0 1 1 0 1 0 0

Step 1: P = 0 0 0 0 0 1 1 0 1 0 0 , The last two bits are 00.

∴ P = 0 0 0 0 0 0 1 1 0 1 0 [Arithmatic right shift]

Step 2 : P = 0 0 0 0 0 0 1 1 0 1 0 . The last two bits are 10.

so, P = 1 0 0 1 1 0 1 1 0 1 0 ; [P = P + S]

∴ P = 1 1 0 0 1 1 0 1 1 0 1 [Right shift]

Step 3 : P = 11001101101 , The last two bits are 01,

so P = 0 0 1 1 0 1 0 1 1 0 1 ; [P = P + A]

∴ P = 0 0 0 1 1 0 1 0 1 1 0 ; [Right shift]

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Step 4 :

P = 0 0 0 1 1 0 1 0 1 1 0 . The last two bits are 10 .

So, P = 1 0 1 1 0 0 1 0 1 1 0 ; [P = P + S]

∴ P = 1 1 0 1 1 0 0 1 0 1 1 [Right shift]

Step 5 :

P = 1 1 0 1 1 0 0 1 0 1 1

The last two bits are 11 .

So, P = 1 1 1 0 1 1 0 0 1 0 1 ; [Right shift]

∴ The product is 1110110010 ,

which is −78 .

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Conclusion :

Though we have proved our result successfully for all outputs , we might face problem as —

1. Used equipment can be damaged if carefully not handled .

2. Using unnecessary wire can cause of short circuit .

3. Use of unnecessary gates may make implementation difficult .

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