**Experiment No.02**

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**Aim :** Study and implementation of the Booth’s Multiplication Algorithm.

**Code :**

import java.util.Scanner;

public class BoothsMulti {

static String toBinary(int num, int bits) {

String s = Integer.toBinaryString(num & ((1 << bits) - 1));

return String.format("%" + bits + "s", s).replace(' ', '0');

}

public static void main(String[] args) {

Scanner sc = new Scanner(System.in);

System.out.print("Enter the Multiplier (M) = ");

int M = sc.nextInt();

System.out.print("Enter the Multiplicand (Q) = ");

int Q = sc.nextInt();

int n = Math.max(Integer.toBinaryString(Math.abs(Q)).length(),

Integer.toBinaryString(Math.abs(M)).length()) + 1;

int A = 0, Q\_1 = 0, count = n;

int Q\_reg = Q;

while (count > 0) {

int Q0 = Q\_reg & 1;

if (Q0 == 1 && Q\_1 == 0) A = A - M;

else if (Q0 == 0 && Q\_1 == 1) A = A + M;

// Arithmetic right shift (A, Q, Q-1)

int combined = (A << n) | (Q\_reg & ((1 << n) - 1));

combined = combined >> 1;

Q\_1 = Q\_reg & 1;

Q\_reg = combined & ((1 << n) - 1);

A = combined >> n;

count--;

}

int product = (A << n) | (Q\_reg & ((1 << n) - 1));

System.out.println("\nBinary representation of Multiplicand (Q) = " + toBinary(Q, n));

System.out.println("Binary representation of Multiplier (M) = " + toBinary(M, n));

System.out.println("Result of multiplication in binary = " + toBinary(product, 2 \* n));

sc.close();

}

}

**Output** :

