NORTH SOUTH UNIVERSITY

Department of Electrical and Computer Engineering

Assignment – 03

Name	: Joy Kumar Ghosh
Student ID	: 2211424 6 42
Course No.	: CSE 225
Course Title	: Data Structures and Algorithm
Section	: 06
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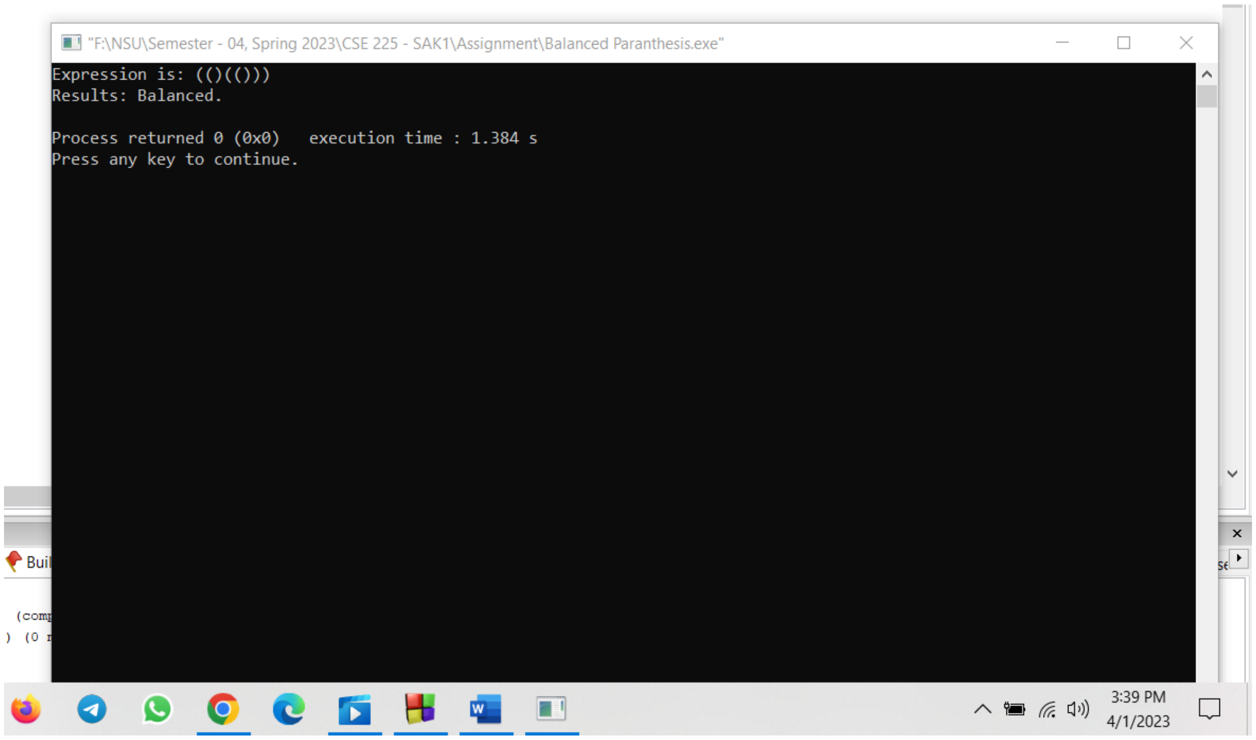
Code:

```
#include <iostream>
using namespace std;

// Stack class declaration
class Stack {
   struct Node {
      char data;
      Node* next;
   };

private:
   Node* top;
public:
   Stack();
   bool isMemoryFull();
   void push(char);
   void pop();
   char peek();
   bool isEmpty();
};


//implementation
Stack::Stack(){
   top = nullptr;
}

bool Stack::isMemoryFull(){
   Node* temp;
   try{
      temp = new Node;
```

```
        delete temp;
        return false;
    }
    catch(bad_alloc& exception){
        return true;
    }
}

void Stack::push(char c){
    if(isMemoryFull()){
        cout << "Memory Full!!" << endl;
    }
    else{
        Node* newNode = new Node;
        newNode->data = c;
        newNode->next = top;
        top = newNode;
    }
}

void Stack::pop(){
    if (top == nullptr){
        cout << "Stack is empty." << endl;
    }
    else{
        Node* temp = top;
        top = top->next;
        delete temp;
    }
}

char Stack::peek(){
    if (top == nullptr){
        cout << "Stack is empty." << endl;
        return '\0';
    }
    return top->data;
}

bool Stack::isEmpty(){
    return top == nullptr;
}


// Function to check if a set of parentheses is balanced or not
bool isBalanced(string expression){
    Stack temp;
    for(int i = 0; i < expression.length(); i++){
        if(expression[i] == '('){
            temp.push(expression[i]);
        }
        else if(expression[i] == ')'){
            if(temp.isEmpty() || temp.peek() != '('){
                return false;
            }
            temp.pop();
        }
    }
    return temp.isEmpty();
}

int main()
{
    string expression = "(()(()))";

    cout << "Expression is: " << expression << endl;
    if(isBalanced(expression)){
        cout << "Results: Balanced." << endl;
    }
    else{
        cout << "Results: Not Balanced." << endl;
    }
    return 0;
}
```

Screenshot:



"F:\NSU\Semester - 04, Spring 2023\CSE 225 - SAK1\Assignment\Balanced Paranthesis.exe"

```
Expression is: (()(()))
Results: Balanced.

Process returned 0 (0x0)   execution time : 1.384 s
Press any key to continue.
```