

Programming Laboratory-I

Assignment No-1

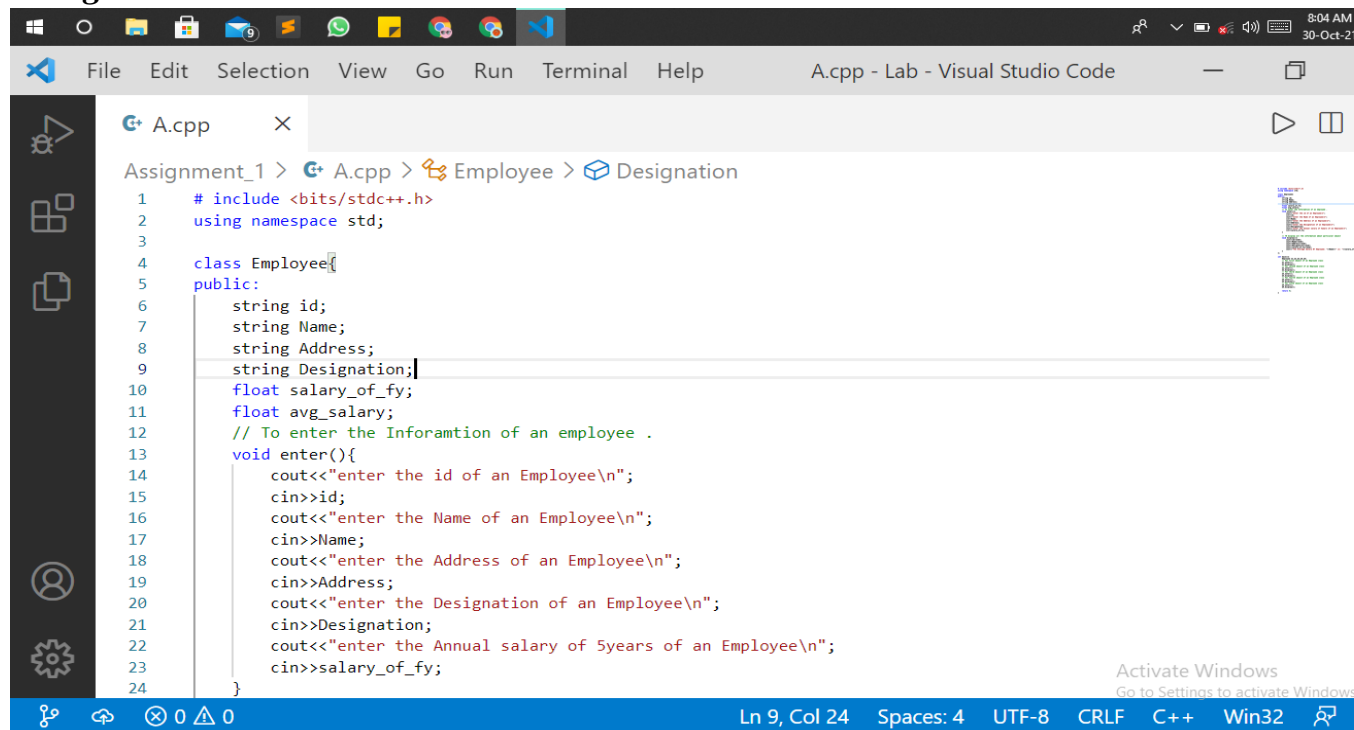
(Basics of object oriented programming)

Name: Sanket Shivaji Jadhav.

Prn: 2020BTECS00005.

1. Create an Employee class to enter and display information of employee such as EmpID, Name, Address, Designation and Salary of last five years and calculate average salary (create five objects to enter and display data).

***Program:**



The screenshot shows the Visual Studio Code editor with a C++ file named A.cpp. The code defines an Employee class with attributes for id, Name, Address, Designation, salary of five years, and average salary. It includes a constructor and a method to enter employee information.

```
1  #include <bits/stdc++.h>
2  using namespace std;
3
4  class Employee{
5  public:
6      string id;
7      string Name;
8      string Address;
9      string Designation;
10     float salary_of_fy;
11     float avg_salary;
12     // To enter the Inforamtion of an employee .
13     void enter(){
14         cout<<"enter the id of an Employee\n";
15         cin>>id;
16         cout<<"enter the Name of an Employee\n";
17         cin>>Name;
18         cout<<"enter the Address of an Employee\n";
19         cin>>Address;
20         cout<<"enter the Designation of an Employee\n";
21         cin>>Designation;
22         cout<<"enter the Annual salary of 5years of an Employee\n";
23         cin>>salary_of_fy;
24     }
```

Visual Studio Code interface details: The top bar shows the menu (File, Edit, Selection, View, Go, Run, Terminal, Help) and the file name (A.cpp - Lab - Visual Studio Code). The left sidebar shows the Explorer, Search, and Run and Debug views. The bottom status bar shows the current line and column (Ln 9, Col 24), spaces (Spaces: 4), encoding (UTF-8), line endings (CRLF), and the active language (C++). A Windows activation watermark is visible in the bottom right corner.

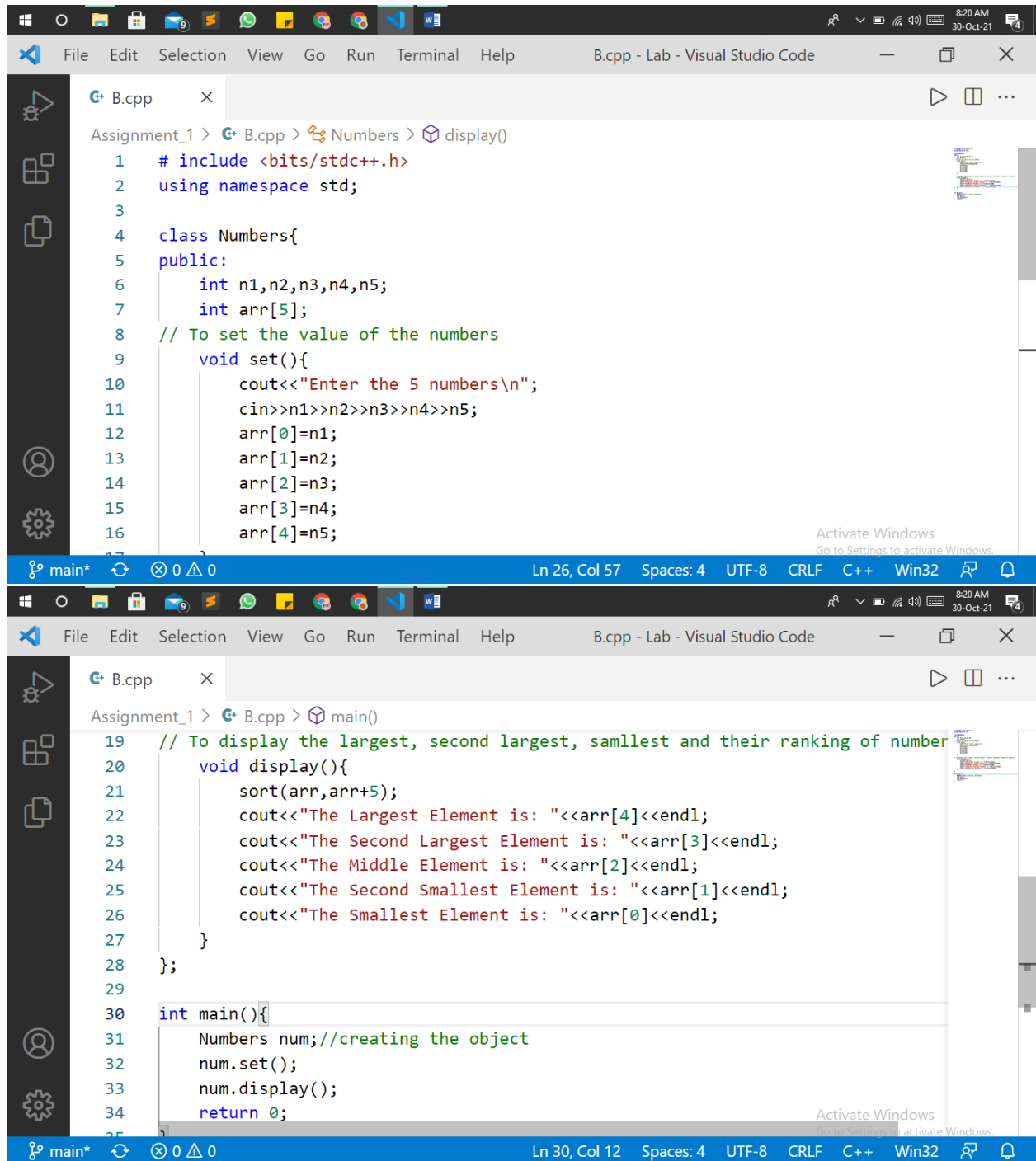
```
26 // TO display all the information about particular object
27 void display(){
28     cout<<id<<endl;
29     cout<<Name<<endl;
30     cout<<Address<<endl;
31     cout<<Designation<<endl;
32     cout<<salary_of_fy<<endl;
33     cout<<"The Average Salary Of Employee: "<<Name<<" is: "<<salary_of_fy/5<<endl;
34 }
35 };
36
37 int main(){
38     Employee e1,e2,e3,e4,e5;
39     // For first object of an Employee class
40     e1.enter();
41     e1.display();
42     // For second object of an Employee class
43     e2.enter();
44     e2.display();
45     // For third object of an Employee class
46     e3.enter();
47     e3.display();
48     // For fourth object of an Employee class
49     e4.enter();
```

***Output:**

```
PS C:\Users\sai\Desktop\Lab> cd "c:\Users\sai\Desktop\Lab\Assignment_1\" ; if ($?) { g++ A.cpp -o A } ; if ($?) { .\A }
enter the id of an Employee
1234
enter the Name of an Employee
Sanjay
enter the Address of an Employee
Hongkong
enter the Designation of an Employee
AssitantManger
enter the Annual salary of 5years of an Employee
2345753
1234
Sanjay
Hongkong
AssitantManger
2.34575e+06
The Average Salary Of Employee: Sanjay is: 469151
enter the id of an Employee
```

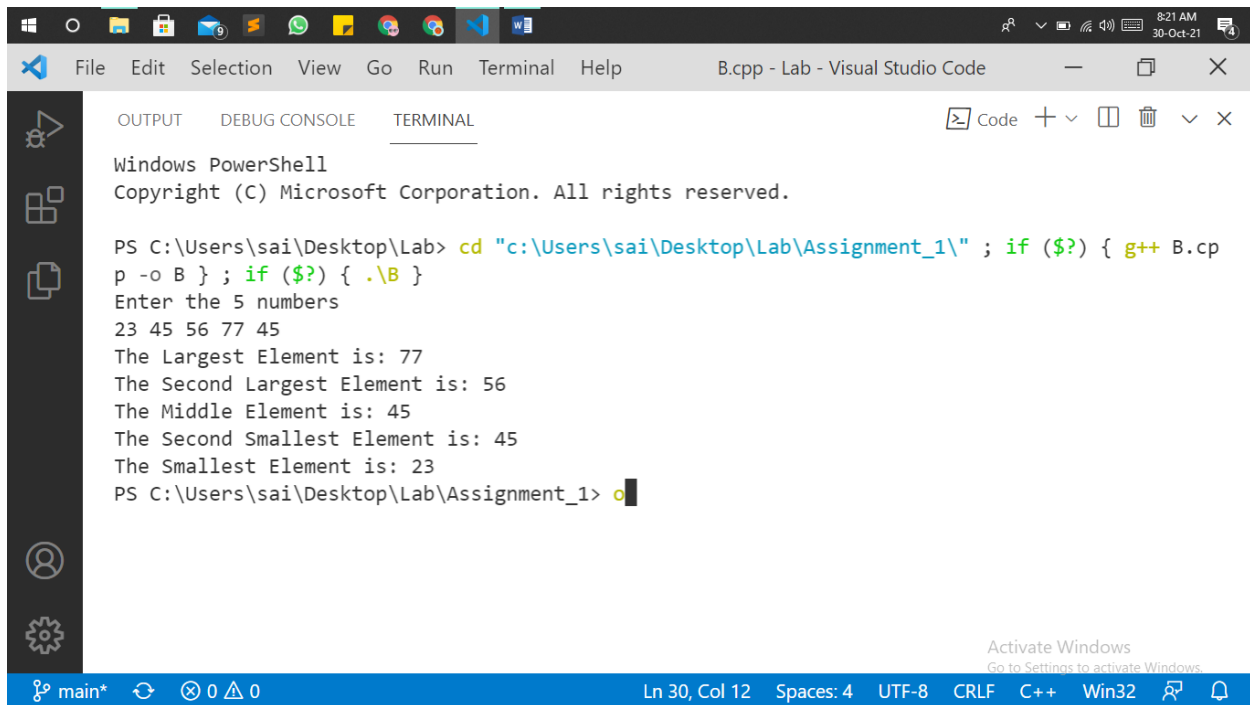
2. Write a program using class to accept 5 numbers from user and display largest, second largest and smallest, second smallest and middle number among five.

***Program:**



```
Assignment_1 > B.cpp > Numbers > display()
1  #include <bits/stdc++.h>
2  using namespace std;
3
4  class Numbers{
5  public:
6      int n1,n2,n3,n4,n5;
7      int arr[5];
8      // To set the value of the numbers
9      void set(){
10         cout<<"Enter the 5 numbers\n";
11         cin>>n1>>n2>>n3>>n4>>n5;
12         arr[0]=n1;
13         arr[1]=n2;
14         arr[2]=n3;
15         arr[3]=n4;
16         arr[4]=n5;
17     }
18 }
19 // To display the largest, second largest, smallest and their ranking of number
20 void display(){
21     sort(arr,arr+5);
22     cout<<"The Largest Element is: "<<arr[4]<<endl;
23     cout<<"The Second Largest Element is: "<<arr[3]<<endl;
24     cout<<"The Middle Element is: "<<arr[2]<<endl;
25     cout<<"The Second Smallest Element is: "<<arr[1]<<endl;
26     cout<<"The Smallest Element is: "<<arr[0]<<endl;
27 }
28 };
29
30 int main(){
31     Numbers num;//creating the object
32     num.set();
33     num.display();
34     return 0;
35 }
```

***Output :**



The screenshot shows the Visual Studio Code interface with a terminal window open. The terminal is running a Windows PowerShell session. The user has navigated to the directory `C:\Users\sai\Desktop\Lab\Assignment_1` and executed a C++ program `B.cpp`. The program prompts the user to enter 5 numbers, and the user has entered `23 45 56 77 45`. The program then outputs the following results:

```
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

PS C:\Users\sai\Desktop\Lab> cd "C:\Users\sai\Desktop\Lab\Assignment_1" ; if ($?) { g++ B.cpp
p -o B } ; if ($?) { .\B }
Enter the 5 numbers
23 45 56 77 45
The Largest Element is: 77
The Second Largest Element is: 56
The Middle Element is: 45
The Second Smallest Element is: 45
The Smallest Element is: 23
PS C:\Users\sai\Desktop\Lab\Assignment_1> o
```

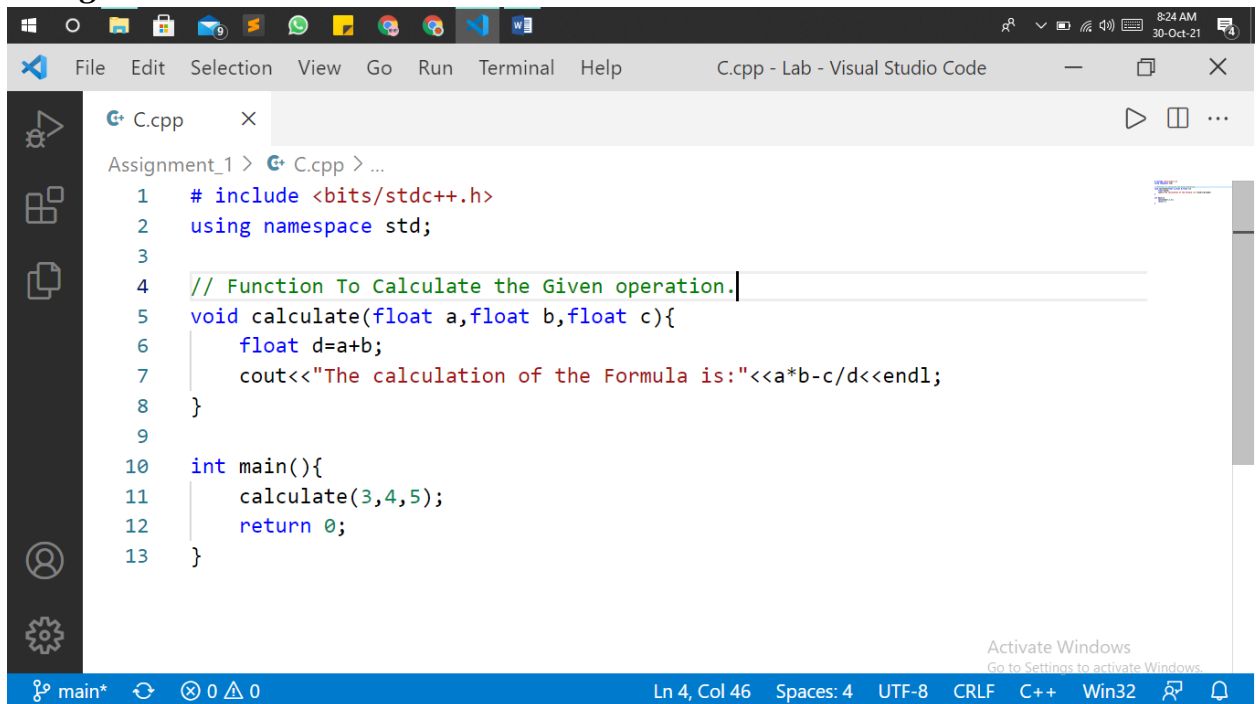
The status bar at the bottom indicates the file is `main*`, line 30, column 12, with 4 spaces, UTF-8 encoding, CRLF line endings, and C++ language.

3Write a program to read 3 values of a, b and c and calculate value of X as

$$X = a * b - c / d$$

Where $d = a + b$

****Program:***

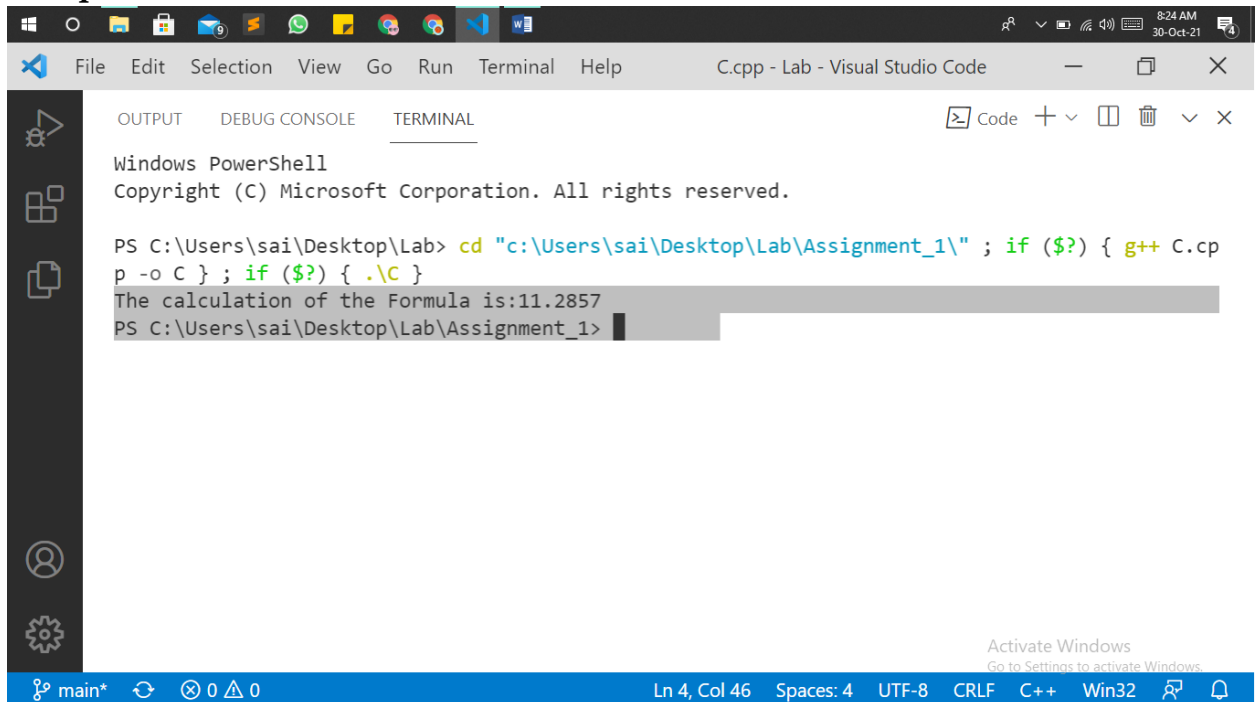


The screenshot shows the Visual Studio Code editor with a C++ file `C.cpp` open. The code is as follows:

```
1 #include <bits/stdc++.h>
2 using namespace std;
3
4 // Function To Calculate the Given operation.
5 void calculate(float a, float b, float c){
6     float d=a+b;
7     cout<<"The calculation of the Formula is:"<<a*b-c/d<<endl;
8 }
9
10 int main(){
11     calculate(3,4,5);
12     return 0;
13 }
```

The status bar at the bottom indicates the file is `main*`, line 4, column 46, with 4 spaces, UTF-8 encoding, CRLF line endings, and C++ language.

***Output :**

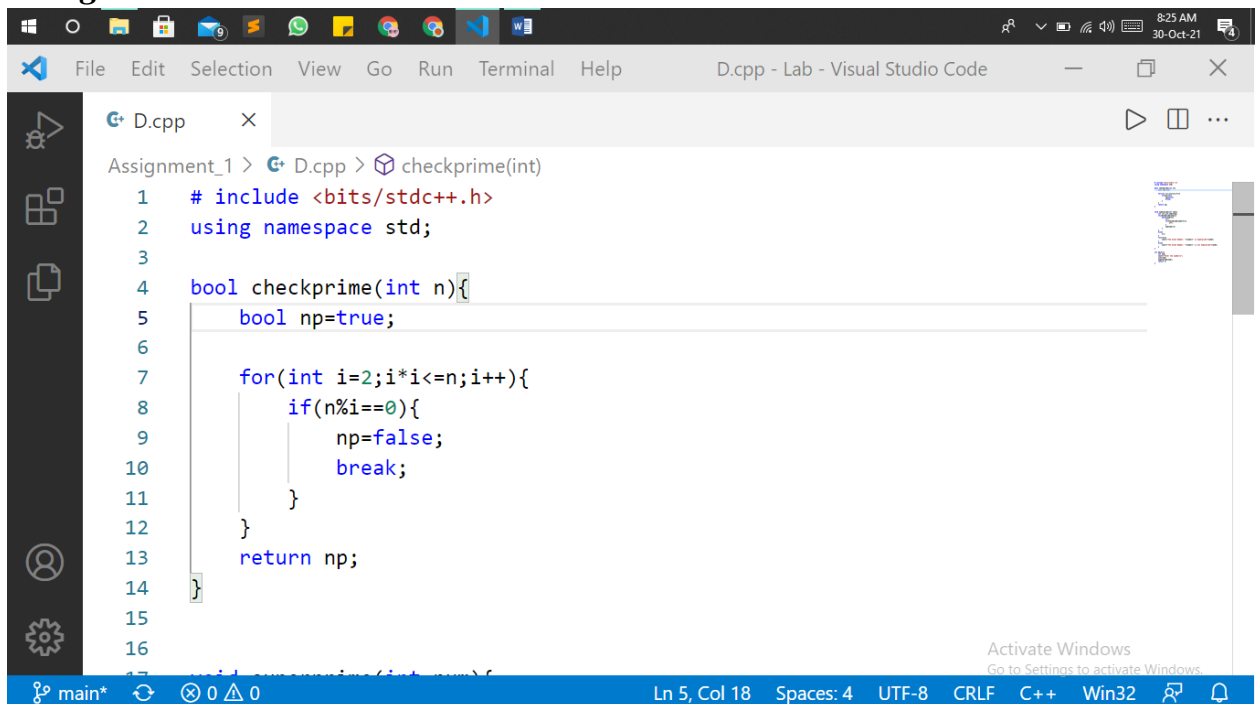


```
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

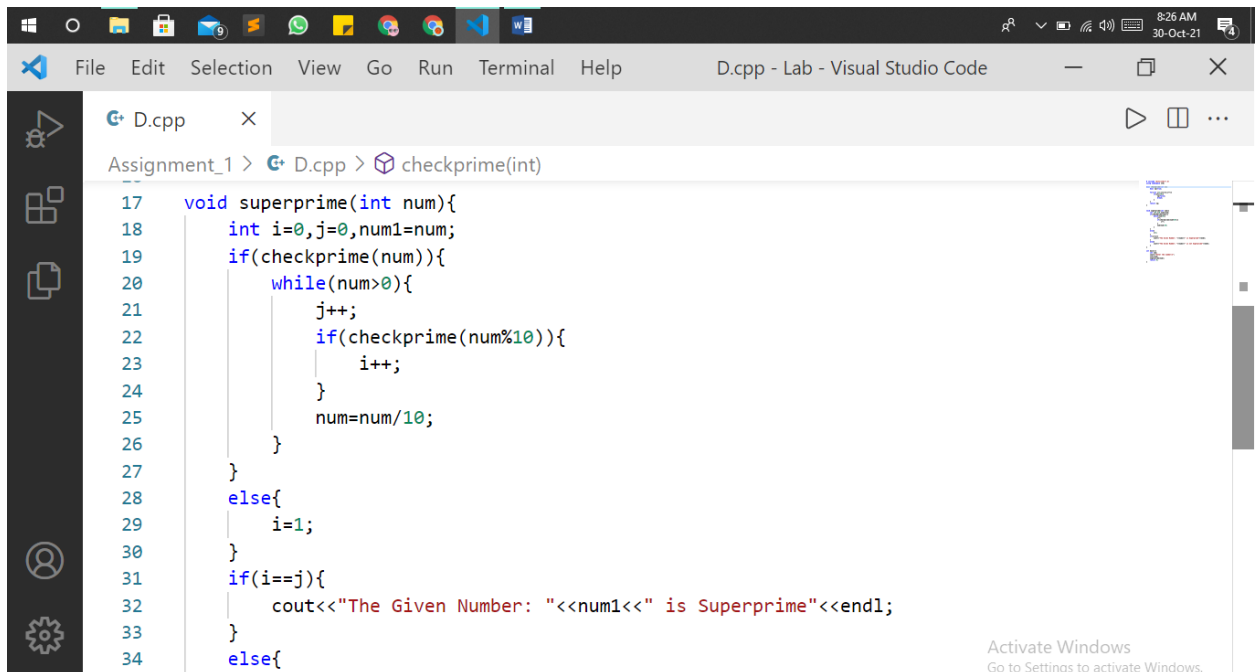
PS C:\Users\sai\Desktop\Lab> cd "c:\Users\sai\Desktop\Lab\Assignment_1\" ; if ($?) { g++ C.cpp -o C } ; if ($?) { .\C }
The calculation of the Formula is:11.2857
PS C:\Users\sai\Desktop\Lab\Assignment_1>
```

4. Write a C++ Program to Check given number is Super Prime number or not using function.(Super prime number is one whose all digits are prime and number is also prime)

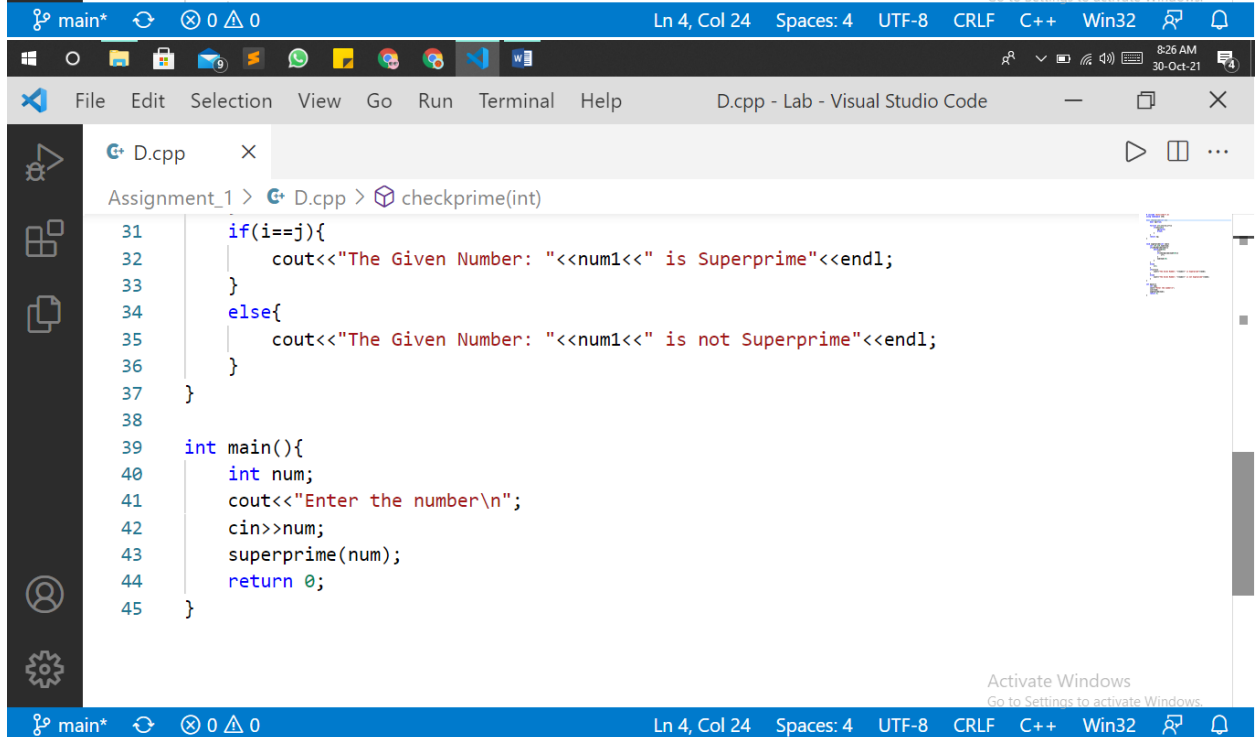
***Program:**



```
Assignment_1 > G+ D.cpp > checkprime(int)
1  #include <bits/stdc++.h>
2  using namespace std;
3
4  bool checkprime(int n){
5      bool np=true;
6
7      for(int i=2;i*i<=n;i++){
8          if(n%i==0){
9              np=false;
10             break;
11         }
12     }
13     return np;
14 }
15
16
17 void sumSuperPrime(int n){
```

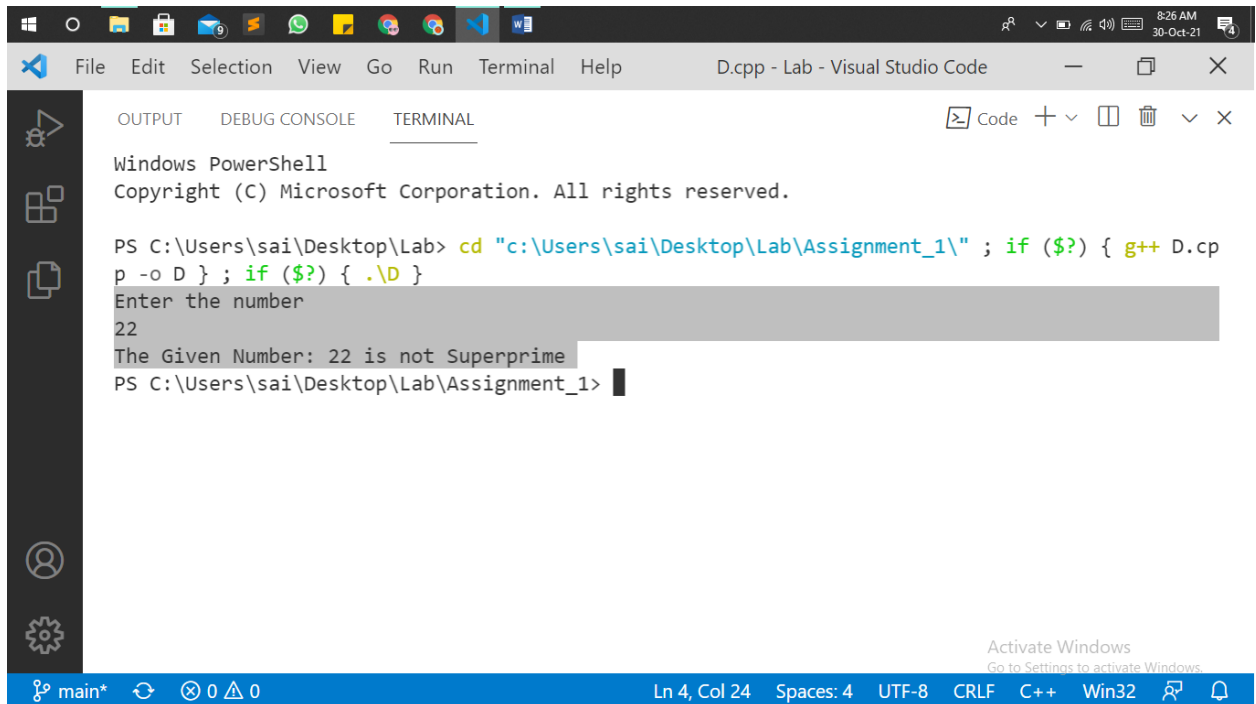


```
17 void superprime(int num){
18     int i=0,j=0,num1=num;
19     if(checkprime(num)){
20         while(num>0){
21             j++;
22             if(checkprime(num%10)){
23                 i++;
24             }
25             num=num/10;
26         }
27     }
28     else{
29         i=1;
30     }
31     if(i==j){
32         cout<<"The Given Number: "<<num1<<" is Superprime"<<endl;
33     }
34     else{
```



```
31     if(i==j){
32         cout<<"The Given Number: "<<num1<<" is Superprime"<<endl;
33     }
34     else{
35         cout<<"The Given Number: "<<num1<<" is not Superprime"<<endl;
36     }
37 }
38
39 int main(){
40     int num;
41     cout<<"Enter the number\n";
42     cin>>num;
43     superprime(num);
44     return 0;
45 }
```

**Output :*



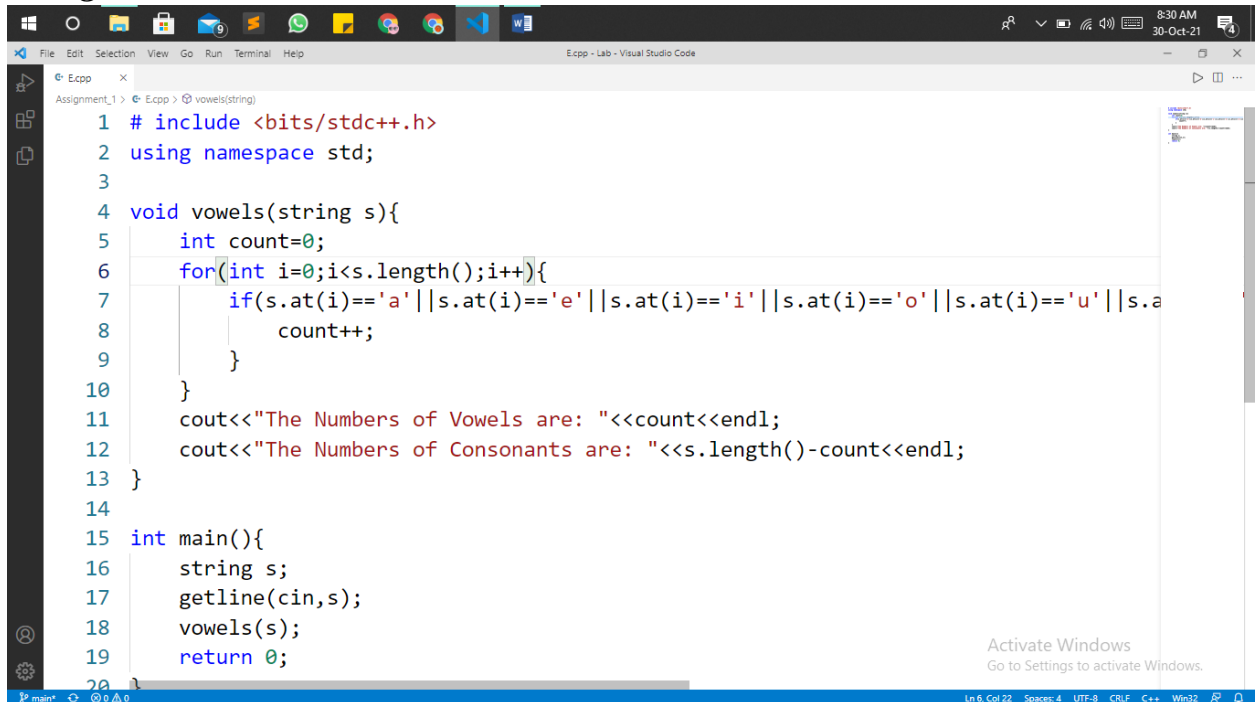
```
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

PS C:\Users\sai\Desktop\Lab> cd "c:\Users\sai\Desktop\Lab\Assignment_1\" ; if ($?) { g++ D.cpp
p -o D } ; if ($?) { .\D }
Enter the number
22
The Given Number: 22 is not Superprime
PS C:\Users\sai\Desktop\Lab\Assignment_1>
```

5. Write a C++ Program to Find Frequency (count) of vowels and consonants (character wise) in below String.

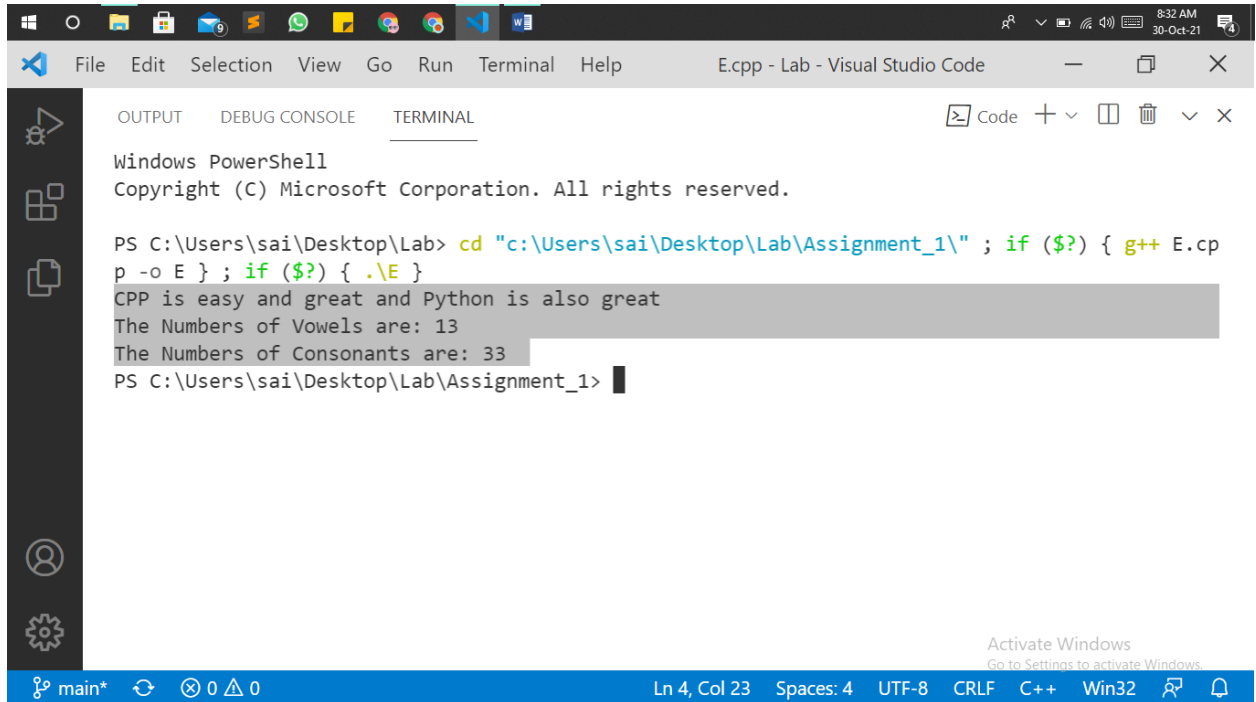
“CPP is easy and great and Python is also great”

**Program:*



```
1 #include <bits/stdc++.h>
2 using namespace std;
3
4 void vowels(string s){
5     int count=0;
6     for(int i=0;i<s.length();i++){
7         if(s.at(i)=='a' || s.at(i)=='e' || s.at(i)=='i' || s.at(i)=='o' || s.at(i)=='u' || s.at(i)=='A' || s.at(i)=='E' || s.at(i)=='I' || s.at(i)=='O' || s.at(i)=='U'){
8             count++;
9         }
10    }
11    cout<<"The Numbers of Vowels are: "<<count<<endl;
12    cout<<"The Numbers of Consonants are: "<<s.length()-count<<endl;
13 }
14
15 int main(){
16     string s;
17     getline(cin,s);
18     vowels(s);
19     return 0;
20 }
```

***Output :**



The screenshot shows the Visual Studio Code interface with the 'TERMINAL' tab active. The terminal displays the output of a C++ program executed in a Windows PowerShell environment. The program's output is as follows:

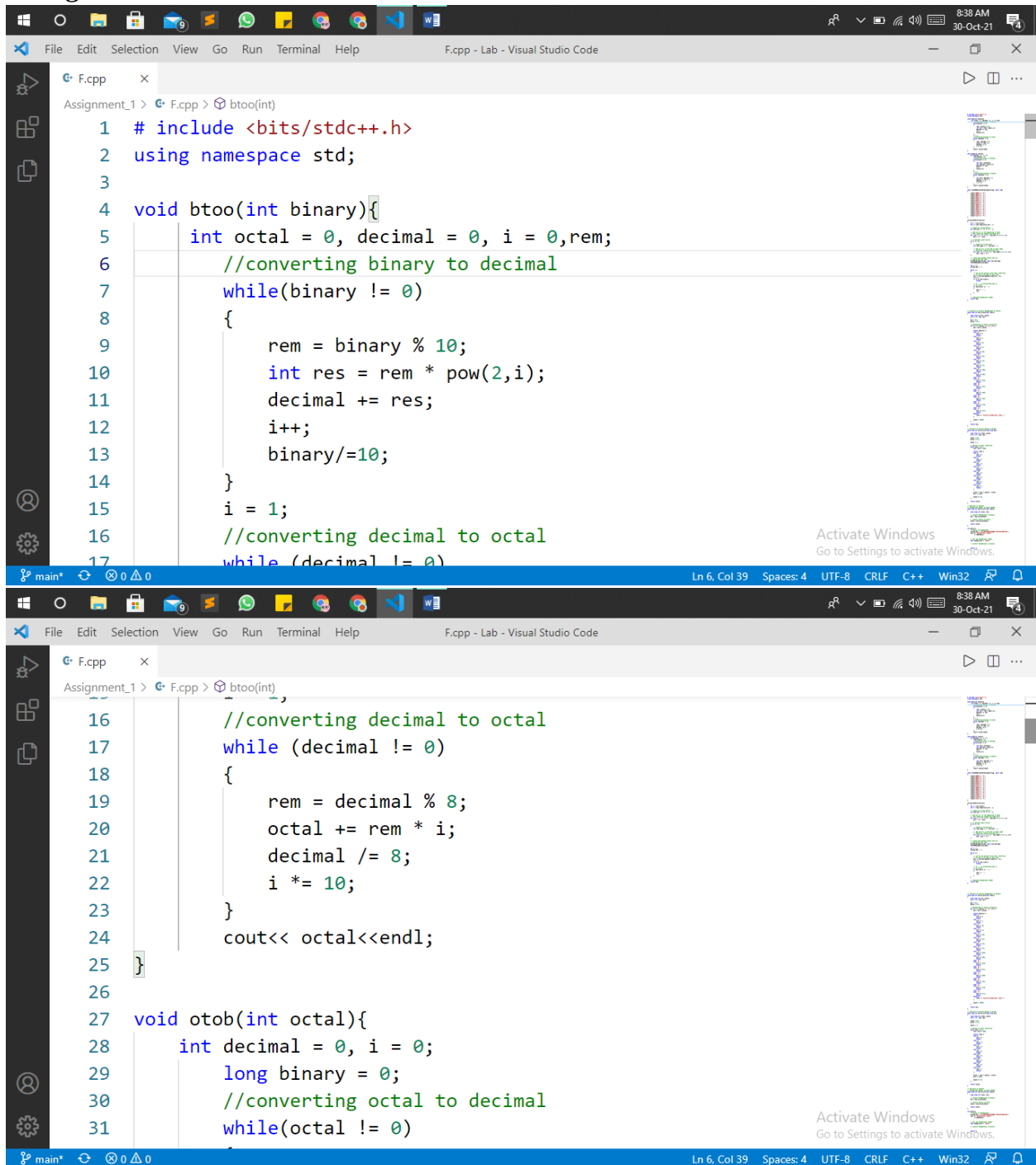
```
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

PS C:\Users\sai\Desktop\Lab> cd "c:\Users\sai\Desktop\Lab\Assignment_1\" ; if ($?) { g++ E.cpp -o E } ; if ($?) { .\E }
CPP is easy and great and Python is also great
The Numbers of Vowels are: 13
The Numbers of Consonants are: 33
PS C:\Users\sai\Desktop\Lab\Assignment_1>
```

The status bar at the bottom indicates the current file is 'main*', the cursor is at 'Ln 4, Col 23', and the file encoding is 'UTF-8'.

6. Write a Menu driven C++ Program to perform below operations (use saperate functions for every operation)
 - a. Binary to Octal
 - b. Octal to Binary
 - c. Binary to Hexadecimal
 - d. Hexadecimal to Binary
 - e. Octal to Hexadecimal
 - f. Hexadecimal to Octal

****Program:***



The image shows two screenshots of the Visual Studio Code editor. The top screenshot displays the first part of a C++ program, and the bottom screenshot displays the second part.

```
1  #include <bits/stdc++.h>
2  using namespace std;
3
4  void btoo(int binary){
5      int octal = 0, decimal = 0, i = 0, rem;
6      //converting binary to decimal
7      while(binary != 0)
8      {
9          rem = binary % 10;
10         int res = rem * pow(2,i);
11         decimal += res;
12         i++;
13         binary/=10;
14     }
15     i = 1;
16     //converting decimal to octal
17     while (decimal != 0)
```

The bottom screenshot continues the code from line 16:

```
16     //converting decimal to octal
17     while (decimal != 0)
18     {
19         rem = decimal % 8;
20         octal += rem * i;
21         decimal /= 8;
22         i *= 10;
23     }
24     cout<< octal<<endl;
25 }
26
27 void otob(int octal){
28     int decimal = 0, i = 0;
29     long binary = 0;
30     //converting octal to decimal
31     while(octal != 0)
```

The status bar at the bottom of the editor indicates: Ln 6, Col 39, Spaces: 4, UTF-8, CRLF, C++, Win32.

```
File Edit Selection View Go Run Terminal Help F.cpp - Lab - Visual Studio Code
F.cpp
Assignment_1 > F.cpp > btoo(int)
31 while(octal != 0)
32 {
33     int rem = octal%10;
34     int res=rem * pow(8,i);
35     decimal += res;
36     i++;
37     octal/=10;
38 }
39 i = 1;
40 //converting decimal to binary
41 while (decimal != 0)
42 {
43     int rem = decimal % 2;
44     binary += rem * i;
45     decimal /= 2;
46     i *= 10;
47 }
```

Activate Windows
Go to Settings to activate Windows.

main* 0 0 0 Ln 6, Col 39 Spaces: 4 UTF-8 CRLF C++ Win32

```
File Edit Selection View Go Run Terminal Help F.cpp - Lab - Visual Studio Code
F.cpp
Assignment_1 > F.cpp > btoo(int)
49 }
50
51 void createMap(unordered_map<string, char> *um)
52 {
53     (*um)["0000"] = '0';
54     (*um)["0001"] = '1';
55     (*um)["0010"] = '2';
56     (*um)["0011"] = '3';
57     (*um)["0100"] = '4';
58     (*um)["0101"] = '5';
59     (*um)["0110"] = '6';
60     (*um)["0111"] = '7';
61     (*um)["1000"] = '8';
62     (*um)["1001"] = '9';
63     (*um)["1010"] = 'A';
64     (*um)["1011"] = 'B';
65     (*um)["1100"] = 'C';
66 }
```

Activate Windows
Go to Settings to activate Windows.

main* 0 0 0 Ln 6, Col 39 Spaces: 4 UTF-8 CRLF C++ Win32

```
File Edit Selection View Go Run Terminal Help F.cpp - Lab - Visual Studio Code
F.cpp
Assignment_1 > F.cpp > btoo(int)
71 string BToH(string bin)
72 {
73     int l = bin.size();
74     int t = bin.find_first_of('.');
75
76     // length of string before '.'
77     int len_left = t != -1 ? t : l;
78
79     // add min 0's in the beginning to make
80     // left substring length divisible by 4
81     for (int i = 1; i <= (4 - len_left % 4) % 4; i++)
82         bin = '0' + bin;
83
84     // if decimal point exists
85     if (t != -1)
86     {
```

```
main* 0 0 0 Ln 6, Col 39 Spaces: 4 UTF-8 CRLF C++ Win32
File Edit Selection View Go Run Terminal Help F.cpp - Lab - Visual Studio Code
F.cpp
Assignment_1 > F.cpp > btoo(int)
86     {
87         // length of string after '.'
88         int len_right = l - len_left - 1;
89
90         // add min 0's in the end to make right
91         // substring length divisible by 4
92         for (int i = 1; i <= (4 - len_right % 4) % 4; i++)
93             bin = bin + '0';
94     }
95
96     // create map between binary and its
97     // equivalent hex code
98     unordered_map<string, char> bin_hex_map;
99     createMap(&bin_hex_map);
100
101     int i = 0;
102     string hex = "";
```

```
103
104     while (1)
105     {
106         // one by one extract from left, substring
107         // of size 4 and add its hex code
108         hex += bin_hex_map[bin.substr(i, 4)];
109         i += 4;
110         if (i == bin.size())
111             break;
112
113         // if '.' is encountered add it
114         // to result
115         if (bin.at(i) == '.')
116         {
117             hex += '.';
118             i++;
119         }
```

```
131 // Function to convert Hexadecimal to Binary
132 long long int hex_to_bin(char hex[])
133 {
134     long long int bin, place;
135     int i = 0, rem, val;
136
137     bin = 0ll;
138     place = 0ll;
139
140     // Hexadecimal to binary conversion
141     for (i = 0; hex[i] != '\0'; i++) {
142         bin = bin * place;
143
144         switch (hex[i]) {
145             case '0':
146                 bin += 0;
```

```
File Edit Selection View Go Run Terminal Help F.cpp - Lab - Visual Studio Code
Assignment_1 > F.cpp > hex_to_bin(char [])
150 break;
151 case '2':
152     bin += 10;
153     break;
154 case '3':
155     bin += 11;
156     break;
157 case '4':
158     bin += 100;
159     break;
160 case '5':
161     bin += 101;
162     break;
163 case '6':
164     bin += 110;
165     break;
166 case '7':
```

Activate Windows
Go to Settings to activate Windows.

```
File Edit Selection View Go Run Terminal Help F.cpp - Lab - Visual Studio Code
Assignment_1 > F.cpp > hex_to_bin(char [])
168     break;
169 case '8':
170     bin += 1000;
171     break;
172 case '9':
173     bin += 1001;
174     break;
175 case 'a':
176 case 'A':
177     bin += 1010;
178     break;
179 case 'b':
180 case 'B':
181     bin += 1011;
182     break;
183 case 'c':
```

Activate Windows
Go to Settings to activate Windows.

```
File Edit Selection View Go Run Terminal Help F.cpp - Lab - Visual Studio Code
Assignment_1 > F.cpp > hex_to_bin(char [])
208
209 // Function to convert Binary to Octal
210 long long int bin_to_oct(long long bin)
211 {
212     long long int octal, place;
213     int i = 0, rem, val;
214
215     octal = 0;
216     place = 1;
217
218     place = 1;
219
220     // Binary to octal conversion
221     while (bin > 0) {
222         rem = bin % 1000;
223
224         switch (rem) {
```

```
File Edit Selection View Go Run Terminal Help F.cpp - Lab - Visual Studio Code
Assignment_1 > F.cpp > bin_to_oct(long long)
260 // Function to Convert
261 // Hexadecimal Number to Octal Number
262 long long int hex_to_oct(char hex[])
263 {
264     long long int octal, bin;
265
266     // convert HexaDecimal to Binary
267     bin = hex_to_bin(hex);
268
269     // convert Binary to Octal
270     octal = bin_to_oct(bin);
271
272     return octal;
273 }
274
275 int main(){
276     // binary to hexadecimal
```

```
274
275 int main(){
276     // binary to hexadecimal
277     string bin = "1111001010010100001.010110110011011";
278     cout << "Hexadecimal number = "
279         | << BToH(bin);
280
281
282     // Get the Hexadecimal number
283     char hexdec[100] = "1AC5";
284
285     // Convert HexaDecimal to Binary
286     char hexb["1AC5"];
287
288     return 0;
289 }
```

***Output :**

```
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

PS C:\Users\sai\Desktop\Lab> cd "c:\Users\sai\Desktop\" ; if ($?) { g++ q6.cpp -o q6 } ; if ($?) { .\q6 }
Which operation do you want to perform?
1. Binary to Octal
2. Octal to Binary
3. Binary to Hexadecimal
4. Hexadecimal to Binary
5. Octal to Hexadecimal
6. Hexadecimal to Octal
4
Enter the hexadecimal number: d32
Its equivalent Binary Number is: 110100110010
PS C:\Users\sai\Desktop> cd "c:\Users\sai\Desktop\" ; if ($?) { g++ q6.cpp -o q6 } ; if ($?) { .\q6 }
Which operation do you want to perform?
1. Binary to Octal
```