Lab # 1: Review of C++
Arrays, Structures, Functions, Classes

Subject: **Data Structures and Algorithms**

Course: **BESE15 B**

Date: **23rd September, 10**

Exercises:

Arrays 1: Program to enter a sentence and output the number of uppercase & lowercase consonants, uppercase & lowercase vowels in sentence.

```
#include <iostream.h>
#include <conio.h>
void main()
{
clrscr();
char line[80];
int number_of_vowels,uc,lc,uv,lv;
uc=lc=uv=lv=0;
cout << "Enter your sentence : " << endl;
cin.getline(line,80);
for(int x=0; line[x]!='\0';x++)
{
if(line[x]=='A'||line[x]=='E'||line[x]=='I'||line[x]=='O'||line[x]=='U')
uv++;
else if(line[x]=='a'||line[x]=='e'||line[x]=='i'||line[x]=='o'||line[x]=='u')
lv++;
else if(line[x]>+65&&line[x]<=90)
uc++;
else if (line[x]>=97&&line[x]<=122)
lc++;
}       //Printing the output.
cout << "Uppercase Consonants = " << uc << "." << endl;
cout << "Lowercase Consonants = " << lc << "." << endl;
cout << "Uppercase Vowels = " << uv << "." << endl;
cout << "Lowercase Vowels = " << lv << "." << endl;
number_of_vowels=uv+lv;
cout << "Number of vowels = " << number_of_vowels << endl;
getch();
}
```

Arrays 2: Finding the position of a digit in the integer array.

```
void main()
{
int arr[5], n, i, p;
clrscr();
for( i =0; i<= 4; i++)
{
cout<<" Enetr value in element  " <<( i +1 )<< " = " ;
cin>>arr[i];
}
p=0;
cout<<"Enter any integer value: ";
cin>> n;
for (i=0; i<=4; i++)
{
if( n==arr[i])
{
p=i+1;
break;
}
}
if (p==0)
cout<<"Number not found";
else
cout<<"Number found at position = " <<p;
getche();
}
```

Structures 1: Define a structure with five members; student name and marks of four subjects. Add marks and calculate total result.

```
#include <conio.h>
#include <iostream.h>
main()
{
struct rec
{
char name[15];
int s1, s2, s3, s4;
};
rec st01 = {"Paul Adams", 991,92,97,86};
int total;
total = st01.s1 + st01.s2 + st01.s3 + st01.s4;
clrscr();
cout<<"Name of student : " << st01.name <<endl;
cout<<"\nMarks in first subject : "<< st01.s1;
cout<<"\nMarks in second Subject: "<< st01.s2;
cout<<"\nMarks in third subject: "<< st01.s3;
cout<<"\nMarks in fourth subject: "<< st01.s4;
cout<<"\nTotal Marks   : " << total;
getche();
}
```

Structures 2: Program that coverts hours, minutes and seconds to seconds.

```
#include <iostream>
#include <conio.h>
struct Time {
   int hours;
   int minutes;
   int seconds;
};
int toSeconds(Time now);
void main() {
   Time t;
   cout<<"Enter Hours, Minutes, Seconds:";
   cin >> t.hours >> t.minutes >> t.seconds;
   cout << "Total seconds: " << toSeconds(t) << endl;
  getch();
}
int toSeconds(Time now) {
   return 3600*now.hours + 60*now.minutes + now.seconds;
}
```

Functions 1: Calculate the greatest common divisor.

```
#include <iostream>
int GCD(int a, int b){
   int Remainder;
   while( b != 0 )
   {
      Remainder = a % b;
      a = b;
      b = Remainder;
   }
   return a;
}
int main(){
        int x, y;
        cout << "This program allows calculating the GCD\n";
        cout << "Value 1: ";
        cin >> x;
        cout << "Value 2: ";
        cin >> y;
        cout << "\nThe Greatest Common Divisor of "
            << x << " and " << y << " is " << GCD(x, y) << endl;
        return 0;
}
```

Function 2: Function for entering student record.

```
#include <iostream.h>
#include <conio.h>
#include <stdio.h>
struct temp {
char name[12];
float marks;
};
main () {
temp abc (void);
temp xyz;
clrscr();
xyz = abc();
cout<<" Name = " <<xyz.name << endl;
cout<<" Marks = "<<xyz.marks<< endl;
cout<< " OK" ;
getche();
}
temp abc(void) {
temp rec;
cout<<" Enter Name: " ;
gets(rec.name);
cout<< " Enter Marks: ";
cin>>rec.marks;
return(rec);
}
```

Classes 1: A simple class called Point, with all necessary functions

```
# include<iostream.h>
# include<conio.h>
# include<math.h>
class point{
        int x,y,z;
public:
        point() {
                x=y=z=0;
        }
        point(int i,int j,int k){
                x=i;
                y=j;
                z=k;
        }
```

```
        point(point &a){
                x=a.x;
                y=a.y;
                z=a.z;
        }
        negate(){
                x=-x;
                y=-y;
                z=-z;
        }
        void print(){
                cout<<"("<<x<<","<<y<<","<<z<<")";
        }
        int norm(){
                return(sqrt(x*x+y*y+z*z));
        }
};
void main(){
clrscr();
point p(2,3,4),p1(p);
cout<<"The point has the coordinates ";
p.print();
cout<<"
The point coordinates after negation ";
p.negate();
p.print();
cout<<"
Normal Distance of the point from (0,0,0) is "<<p.norm();
cout<<"
The coordinates of the point p1 after copy constructor is ";
p1.print();
getch();
}
```

Class 2: Class for Library

```
# include<iostream.h>
# include<conio.h>
// Creating a basic template for book and magazine
class lib
{
        private:
                char title[20];
                char pub[20];
                unsigned int acc_no;
        public:
//method for getting inputs
                void get_details()
                {
                        cout<<"Enter the book title"<<endl;
                        cin>>title;
                        cout<<"Enter the publisher name"<<endl;
                        cin>>pub;
                        cout<<"Enter the accession number"<<endl;
                        cin>>acc_no;
                }
//method for showing output
                void show_details()
                {
                        cout<<"Title : "<<title<<endl;
                        cout<<"Publisher : "<<pub<<endl;
                        cout<<"Accession No. : "<<acc_no<<endl;
                }
};
// Class Book derived from lib
class book :  private lib
{
private:
        char author[20];
public:
        void get_details()
        {
                lib::get_details();
                cout<<"Enter the author's name: "<<endl;
                cin>>author;
        }
        void show_details()
        {
                lib::show_details();
                cout<<"Autohr : "<<author<<endl;
        }
```

```
};
//Class for Magazine derived from lib
class magz :  private lib
{
private:
        char editor[20];
public:
        void get_details()
        {
                lib::get_details();
                cout<<"Enter the editor's name: "<<endl;
                cin>>editor;
        }
        void show_details()
        {
                lib::show_details();
                cout<<"editor : "<<editor<<endl;
        }
};
void main(void)
{
 clrscr();
//creating objects
book b;
magz m;
b.get_details();
m.get_details();
b.show_details();
m.show_details();
getch();
}
```