National University of Computer and Emerging Sciences, Lahore Campus

Course:	OOP LAB	Course Code:	CL1004
Program:	BSCS	Semester:	Spring 2022
Duration:	2 hours	Total Marks:	30
Paper Date:	22-April-2022	Weight	%
Section:	2N	Page(s):	3
Exam:	Midterm	Roll No.	

Read below Instructions Carefully:

- Understanding the question statement is also part of the exam, so do not ask for any clarification. In case of any ambiguity, make suitable assumptions.
- You have to complete exam in 2 hrs. Remaining time will be used for submission.
- For Q1, submit a single file (containing classes definitions and main) named as 21L-1122-Q1.cpp.
- For Q2, submit a single file (containing definitions and main) named as 21L-1122-Q2.cpp.
- Submission path: \\cactus1\Xeon\Spring 2022\Arfa Masood\OOP Mid\2N
- Your code should be intended and commented properly. Use meaningful variable names.
- It is your responsibility to save your code from being copied. All matching codes will be considered cheating cases. PLAGIARISM will result in forwarding of case to Disciplinary Committee and negative marks in Midterm.

Question No. 1 **(10 Marks)**

a) Write a program that dynamically allocates an array large enough to hold a user defined number of test scores. Once all the scores are entered, the array should be passed to a function that sorts them in ascending order another function should be Called that calculates the average score. The program should display the sorted list of scores and averages with appropriate headings. Use pointer notation rather than array notation whenever possible.

b) Modify the above part to allow the user to enter name-score pairs. For each student taking a test, the user types the student's name followed by the student's integer test score. Modify the sorting function so it takes an array holding the student names and an array holding the student test scores. When the sorted list of scores is displayed, each student's name should be displayed along with his or her score. In stepping through the arrays, use pointers rather than array subscripts.

Question No. 2 **(20 Marks)**

Create a class **teacher** which stores the following information.

char *Id; //Id no of teacher like 2383

int semester; //semester number

char *name; //name of student

float salary;

char * phone; //phone number of teacher

Add the constructor and copy constructor to the **Teacher** class. Make sure the destination object is a deep copy of the source object. In the constructor without parameters initialize everything to zero/NULL. Also, make a constructor that takes all the above 5 data members as parameter

Your class Teacher should have all the necessary function required to complete the below task.

```
int main()
{
        Teacher T2("2383", 4,"Ali Ahmed", 3300.34,"987728837");
        cout<< T2;
        // The cout should output the following
        // 2383
        // 4
        //Ali Ahmed
        //3300.34
        //98772883
        Teacher T1,
        cin >> T1; // Takes input from user.
        cout<< T1;  /* displays the Id, name, salary, semester and contact number of the Teacher  object*/
        if( T1== T2)
```

```
            cout<<" Both are Equal";
        else
            cout<<" Not Equal";
T1[3] = 4; // should make the phone number 98742883
        cout<<T1;
int x = directory[4]//  should store 2 in x.
        cout<< x;

        return 0;
}
```

char 8

21.5 x0.5 = 20

National University of Computer and Emerging Sciences, Lahore Campus

Course Name:	Object Orientod Programming	Course Code:	CS217
Degree Program:	BS (CS, SE, DS)	Semester:	Spring 2022
Exam Duration:	60 Minutos	Total Marks:	25
Paper Date:	24-March-2022	Weight	15
Section:	ALL	Page(s):	4
Exam Type:	Midterm-I		

Student : Nam Roll No. Section.

Instruction/Notes: ...s. Answer in the space provided. Answers written on rough sheet will not be marked. Do not use pencil or red ink to answer the questions. In case of confusion or ambiguity make a reasonable assumption.

12.5 x0.5

Question 1: (Marks: 5+5+5)

Part(a)

Identify the error (syntax/logical) in the following code. Mention the error and highlight the exact line having the error/throwing the exception. Rewrite the corrected code (rewrite only that part of the code that requires correction) and show the output of the corrected code.

```
class Color{
 int red;
 int green;
 int blue;
 Color();
 Color(int,int,int);
 void print();
};
Color::Color(){}
Color::Color(int r,int g,int b){
  red = r;
  green = g;
  blue = b;
}

void Color::print(){
  cout << red << '.' << green << '.' << blue ;
}

int main(){
  Color c1, c2(100,150,255);
  c1.print();
  c2.print();

  return 0;
}
```

→ Accessor missing

Constructors should be in header

Corrected Code:

```
private:

public:
  Color(){}
  Colour(int,int,int){
  void print();
  red = r;
  green = g;
  blue = b; }
```

5

Output:

G.G.G
100.150.255

G.G.G 100.150.255

parameterized constructor should be used to for et object c1 to avoid garbage value

for example Color c1 (10,20,30);

G — Garbage.

in that case output would be

10.20.30

Part(b)

Identify the error(s) (syntax/logical) in the following code. Mention the error and highlight the e... having the error/throwing the exception. Rewrite the corrected code (rewrite only that part of the c... requires correction) and show the output of the corrected code.

```
void AllocateMemory(int* arr)
{
        arr = new int[5];
}
void main()
{
        int* arr[3];
        int value = 1;

        for(int i=0; i<3 ; i++)
        {
                AllocateMemory(arr[i]);
                for(int j=0 ; j<5 ; j++)
                {
                        arr[i][j] = value;

                        value++;
                }
        }
        for(int i=0; i<3 ; i++)
        {
                for(int j=0; j<5 ; j++)
                {
                        cout<<arr[i][j]<<"\t";
                }
                cout<<endl;
        }
}
```

probably function heading should have double pointer parameter, F

Should be point double pointer

Corrected Code:

```
void AllocateMemory(int**& arr)

int ** arr = new int[3];

for(int i=0;i<3; i++)
    delete [] arr[i];
delete [] arr;
```

Memory Leak didn't delete the memory on heap.

Output:

```
1   2   3   4   5
6   7   8   9   10
11  12  13  14  15
```

2.5

Part(c)

What is the output of the following code

```
void fun(int* a,int s,int* f, int m){
    for(int i=0; i < s; i++){
        if (*(a+i) < m){
            (*(f + *(a+i)))++;
        }
    }
}

int main()
{
    int array[] = {2,3,2,2,1,7,3,4,0,1};
    int result[5] = {0};
    fun(array,10,result,5);
    for(int i=0;i < 5;i++){
        cout << i << ':' << result[i] << endl;
    }

    return 0;
}
```

Output:

```
0: 1
1: 2
2: 3
3: 2
4: 1
```

5

array s results m

a 10 f 5

i<10

results

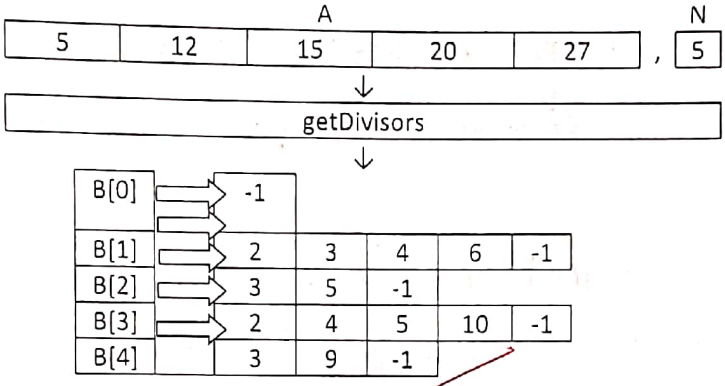
array

Question 2:

Write a C++ function *getDivisors* that receives an array, A, containing non-negative integers, and its size, n. The task is to compute the Divisors (other than 1 and the number itself) of all the numbers in A. The function must accomplish this task in the following way:

- All Divisors of an integer must be stored in a separate, dynamically allocated array, with -1 placed in the last index. The size of the dynamic array must exactly equal to #of Divisors+1.
- Pointers to these dynamic arrays are stored in another dynamic array (call it B) of size n. So that, when the function has finished, B[i] contains a pointer to the dynamic array containing the divisors of the number A[i], where $0 \le i < n$.
- Lastly, the function returns B.

Following is an example input and its corresponding output, shown pictorially:




```
int **getDivisors(int* A, int n)
{
    int size=0;
    for(int i=0; i<n; i++)
    {
        size=0;
        for(int j=2; j<A[i]; j++)
        {
            if(A[i]%j==0)
                size++;
        }
        int** B = new int*[n];
        B[i] = new int[size+1];
        int k=0;
        for(int j=2; j<A[i]; j++)
        {
            if(A[i]%j==0)
            {
                B[i][k] = j;
                k++;
            }
        }
        B[i][k] = -1;
    }
    return B;
}
```

out of loop.