Object-Oriented Programming

(CS Department)

Lab Midterm Exam

Fall 2022

Version 1 (ONE)

Allowed Time = 90 minutes

Instructions:

1. Kindly submit the work on the portal.
2. Submission instructions are given below:
    i. Create one folder for each question
    ii. All files related to a particular question must be inside their respective folder.
    iii. For each class, students MUST create a `.h` and a `.cpp` file.
    iv. There would therefore be three files for each question (main.cpp + class header + class cpp)
    v. Zip the folders together and submit the zipped file
    vi. The name of the zipped file MUST be your registration number.
3. Use constant functions wherever required.
4. Students are NOT ALLOWED to use:
    i. the data type `string`
    ii. built-in functions such as `strcopy()`, `strcpy_s`, or `.length()`.
5. The codes should not have memory leakage.
6. There shouldn't be dangling pointers in the solution provided.
7. Marks cannot be given on codes with run-time or compile-time errors.
8. Lab or course Instructors will NOT answer queries related to the exam.
9. If required, make necessary assumptions and write the same in the code as comments.
10. Do not ask questions during the exam.

Question 1: 10 marks

Look at the `main()` function and the output given below. Provide the complete implementation of the required class so that the `main()` executes without any errors.

main.cpp

```
#include "Triangle.h"

int main()
{
	cout << endl <<"-----Question 1-----" << endl;

	Triangle t1;
	t1.display();
	cout << "Area = " << t1.area() << endl << endl;

	Triangle t2(6,10.2);
	t2.display();
	cout << "Area = " << t2.area() << endl;

	cout <<"--------------------" << endl << endl;

	return 0;
}
```

Output

```
-----Question 1-----
Base = 0 Height = 0
Area = 0

Base = 6 Height = 10.2
Area = 30.6
--------------------
```

Question 2: 20 marks

Look at the `main()` function and the output given below. Provide the complete implementation of the required class so that the `main()` executes without any errors. You are **NOT ALLOWED** to use the data type `string` or built-in functions such as `strcopy()`, `strcpy_s`, or `.length()`. We should not have memory leakage in our program. Furthermore, there shouldn't be dangling pointers in the solution provided.

main.cpp

```
#include "Employee.h"

int main()
{
	cout << endl <<"-----Question 2-----" << endl;

	Employee e1;

	char name[7] = {'M','r',' ','O','O','P','\0'};
	int age = 88;
	float salary = 22500.2;
	Employee e2(name, age, salary);
	cout << "Name of e2 = " << e2.getName() << endl;
	name[0] = 'X';
	name[4] = 'W';
	name[5] = 'L';


	Employee e3 = e2;
	e3.increaseSalaryBy(10000.5);
	char name2[11] = {'M','r',' ','A',' ','G','r','a','d','e','\0'};
	e3.setName(name2);
	e3.setAge(20);
	cout << "Name of e3 = " << e3.getName() << endl;
	name2[0] = 'X';
	name2[3] = 'F';

	Employee e4;
	e4 = e3;

	cout << endl << "E1" << endl;
	e1.display();
	cout << endl << "E2" << endl;
	e2.display();
	cout << endl << "E3" << endl;
	e3.display();
	cout << endl << "E4" << endl;
	e4.display();
	cout <<"--------------------" << endl << endl;

	return 0;
}
```

Output

```
-----Question 2-----
Name of e2 = Mr OOP
Name of e3 = Mr A Grade

E1
Name = nullptr
Age = 0
salary = 0

E2
Name = Mr OOP
Age = 88
salary = 22500.2

E3
Name = Mr A Grade
Age = 20
salary = 32500.7

E4
Name = Mr A Grade
Age = 20
salary = 32500.7
--------------------
```