National University of Computer and Emerging Sciences, Lahore Campus

Course:	**Object Oriented Programming**	**Course Code:**	CS217	
Program:	**BS(Computer Science)**	**Semester:**	**Spring 2021**	
Due Date:	**05-June-2021**	**Total Marks:**	100	
Section:	**F**	**Weightage**	**4%**	
Evaluation:	**Homework-03**			

Submission Path: Google classroom

Your homework is to write a section of code that demonstrates the following aspects of OOP in C++:

1. Correct use of all access specifiers (public, private, protected) in an appropriate way.
2. Over-loading using either methods or constructors.
3. Abstract classes with a method that is required in all derived classes.
4. Operations on pointers to an object.
5. Over-riding of a method of an abstract class.
6. An example of multiple inheritance (it does not have to make perfect sense).
7. Separate compilation with all classes in your assignment (i.e., all classes should have .cpp and .h files).
8. An example of an object passing itself to a function (not part of a class), which modifies that object.
9. A class with a modified copy constructor and demonstrate the effect of this on pass-by-value and pass-by-reference calls.
10. A working destructor with some basic functionality on one of your classes. Demonstrate it working in your main() function.
11. Correct use of three over-loaded operators (e.g., +, = and ==) for one of your classes(must include pre and post).
12. Correct use of new and delete for the allocation of an object/objects, with operations on the object using pointers. (Can be combined with other points)
13. Using 2D Dynamic Array(correct allocation and deallocation with constructor and destructor).
14. Static states of a class and an example usage. Demonstrate the impact.
15. Demonstrates the difference between a C++ class and a C++ struct.
16. Passing an object to a method by constant reference. Demonstrate the impact.

There are 16 points to address and there is 10% available for the assignment, so 0.5% per point is the outline marking scheme. If you address 11 out of 16 points clearly and correctly then you should receive 7/10 (or 70% on Loop).

You have to create an application that consist of all of these properties if one of property in linked with your application (working not effecting the application), the marks will be deducted for that part.

Please note, I would recommend that you hard code the input of data, i.e., don't set up a menu system and do not read values in from the user using cin. It is not necessary for this assignment and would lengthen the amount of work involved considerably.

As for the topic; that is up to you, but please keep it simple. If one of the points does not fit into your application, just add it anyway for demonstration, i.e., the application does not have to make perfect practical sense. The rules are that:

- You CANNOT use bank accounts, personnel/university structures, vehicles/cars, geometric shapes or animals/plant/fish/insect classifications as the application examples. This is because they are the standard examples used in my notes and in books on C++.
- You must use a single topic for all of the points. You CANNOT write an individual code project for each point.

REPORT STRUCTURE (IMPORTANT!)

There should be a brief introduction at the start of your report that explains your application idea and LISTS CLEARLY one numbered paragraph for each of the points listed above (in the same order as numbered) and explains where in your code they have been implemented. In your code comment the sections where you show the points above, detailing the point that you have addressed. This is for the sole purpose of making it easier for the tutor to correct -- but without this your assignment will not be marked.

Submit your assignment electronically as a SINGLE Google Docs generated document (not live link share!), Word Document, raw text document or PDF. This document should *only* have the following text sections:

- **Title and Student name, e-mail address, id and programme details etc.**
- **Introduction** - to briefly introduce your application and program structure.
- **Implementation** - one numbered paragraph for each of the points ordered as above, which points to the location in the code where the point has been implemented – e.g. Point 6 – the class Account is an abstract class because it is missing the display() method implementation and this has been provided in the child CurrentAccount class.
- **Source Code -** Properly Formatted and Spaced Code. The code should be zipped with the text document. The code should have comments referring back to the 20 numbered paragraphs.

You should *not* submit a working executable or compilable source code. This assignment should give you some practical experience for the end of semester exam, so I am looking on it as a study aid.

One final important issue - Please note that by the electronic submission of your first assignment I am assuming that you are familiar with the academic rules for assignments. The assignment should be 100% your own work. If any unreferenced work is used from any other source (including colleagues, the Internet or past students) it will be a serious matter and referable to the disciplinary board. Please note that all assignment work can be the subject of an interview process. All assignments for this module will be uploaded to plagiarism detection software where the content will be analysed and compared to other assignment from this year and previous years.