National University of Computer & Emerging Sciences, Karachi
Fall-2019
CS-Department
Final Examination
4th December 2019, 8:30 am – 10:30 am

Course Code: CL-103	Course Name: Object Oriented Programing Lab
Instructor Name / Names: Ms. FARAH SADIA	
Student Roll No:	Section No: Gr3(Wednesday)

Instructions:

- Return the question paper.
- Read each question completely before answering it. There are **3 questions and 2 pages**
- In case of any ambiguity, you may make assumption. But your assumption should not contradict any statement in the question paper.

Time: 120 minutes.   **Max Marks:** 30 points

Question 1:   Marks:10

A complex number is a number in the form a + bi, where a and b are real numbers and i is $\sqrt{-1}$. The numbers a and b are known as the real part and imaginary part of the complex number, respectively. You can perform addition, subtraction, multiplication, and division for complex numbers using the following formulas:

$$a + bi + c + di = (a + c) + (b + d)i$$
$$a + bi - (c + di) = (a - c) + (b - d)i$$
$$(a + bi)*(c + di) = (ac - bd) + (bc + ad)i$$
$$(a + bi)/(c + di) = (ac + bd)/(c^2 + d^2) + (bc - ad)i/(c^2 + d^2)$$

Design a class named Complex for representing complex numbers and the function add, subtract, *multiply* , *divide* for performing complex-number operations, and the *toString* function for returning a string representation for a complex number. The *toString* function returns *(a + bi)* as a string. If *b* is *0* , it simply returns *a* .

Provide three constructors *Complex(a, b)* , *Complex(a)* , and *Complex()* . *Complex()* creates a *Complex* object for number *0* and *Complex(a)* creates a *Complex* object with *0* for *b* .

a) Overload the operators +, -, *, /, [ ], << and >> for input and output complex numbers.
b) Overload the operators +, -, *, / as non-member functions, Overload [ ] so that [0] returns a and [1] returns b.it should also throw a run time exception when subscript is out of range i.e [2].

Question #02:   Marks: 10

Habib Bank Limited maintains two kinds of accounts for customers, one called as savings account and the other as current account. The savings account provides compound interest and withdrawal facilities but no cheque book facility. The current account provides cheque book facility but no interest. Current account holders should also maintain a minimum balance and if the balance falls below this level, a service charge is imposed.

Create a class account that stores customer name, account number and type of account. From this derive the classes cur_acct and sav_acct to make them more specific to their requirements. Include necessary member functions in order to achieve the following tasks:

a) Accept deposit from a customer and update the balance.
b) Display the balance.
c) Compute and deposit interest.
d) Permit withdrawal and update the balance.

e) Check for the minimum balance, impose penalty, necessary and update the balance.

f) Do not use any constructors. Use member functions to initialize the class members.

$P=F(1+r)n$

The terms in the formula are as follows:

- P is the present value, or the amount that you need to deposit today.
- F is the future value that you want in the account (in this case, Rs. 10,000).
- r is the annual interest rate (expressed in decimal form, such as .042).
- n is the number of years that you plan to let the money sit in the account.

Question # 03:

Write a program using function template list that generates ten numbers and sorts them based on following criteria:

Sort even number in ascending order

Sort odd number in descending order

Place all even numbers in the initial part of list then odd numbers.

Example: 2, 5, 1, 0, 4, 7, 9, 3, -2, 10, 20, 15

The answer is: -2, 0, 2, 4, 10, 20, 15, 9, 7, 5, 3,1

Use a template function for displaying the list that uses output iterator for displaying the elements of the list.

Best of Luck!