UNIVERSITY OF LAGOS
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
B.Sc. (Hon.) Computer Engineering Degree Examination
CPE311: COMPUTER PROGRAMMING LANGUAGES

FIRST SEMESTER **2019/2020 SESSION**

INSTRUCTION: ATTEMPT ANY QUESTION **TIME:** $\frac{3}{4}$ **HOUR**

File naming format: MatricNo_CPE311_2019-2020_Q?

QUESTION 1

Write a C++ program that setup a class Quadratic that uses the C++ complex class to determine the roots of quadratic equation $ax^2+bx+c=0$ where *a*, *b* and *c* are coefficients. The class has two constructors, the first initializes all the coefficients to zero and the other initializes all the coefficients set by the user. Also within the class there are functions SetCoefficient that set the coefficient of the equation by user after an object had been instantiated, GetCoefficient that takes in a pointer to an object of type Coefficient that have data members that are coefficients of quadratic equation which read the values of the coefficients, CalcDeterminant which is a private function that determine the type of roots such as real repeated, real different or imaginary, QuadraticRoots that calculate the roots of the equation after calling the CalcDeterminant and WriteRoots function also takes in a pointer to an object of structure type ComplexRoots that have data members root1 and root2 of type complex due to the C++ complex class that print the roots of the equation to screen. The roots of a quadratic equation and determinant equations are:

$$x_{1,2}=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$$

$$det=b^2-4ac$$

For the coefficient *a, b* and *c,* use the variable names SecondOrderCoeff, FirstOrderCoeff and ConstantCoeff, respectively as their variable declaration.

In the main function, create thr objects of type Quadratic, Coefficient and ComplexRoots. Get the coefficients and the roots of the object and display them on the screen. Furthermore create three more objects and set the coefficients of the quadratic equation for the three cases of real roots, real repeated roots and complex roots. On each occasion determine the roots and display then results on the screen. of type Quadratic

QUESTION 2

Write a C++ program that setup a class Cgpa that has two constructors, a default constructor that set data members units_taken, units_passed, weighted_score and gpa (grade point average) all being integer except gpa that is a floating-point number to zero and the parameter constructor initilaizes them too a user defined values. The methods CalcParameters takes in an array of Course value up to twelve elements that

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is a user defined structure having datatypes string, int, char and float for data members course_code, course_unit, course_grade and course_point, respectively, and the number of courses passed to it. The member function calculates the total units taken, total units passed and weighted score for a student. The gpa of a student is determine from a function CalcGpa which divides the weighted score with the total unit taken. The unit pass of a course is when the grade point is greater than zero, where a course grade and its grade point is represented by A-5, B-4, C-3, D-2, E-1 and F-0. A function GetSummaryResults takes a pointer to a structure Summary having data members similar to the class data members and returns the results of the computation of the students semester result to the calling function. Also set up an overlaoded operator + that adds the students previous cumulative results with that of the semeter results and calculate the cumulative gpa.

In the main function, instantiate objects of type Cgpa, Summary and three Course arrays and preset the Course object with three courses code, units, grades and then call the CalcParameter function to obtain the units taken, units passed and weighted score. Using the Summary object retrieve the results from the object Cgpa and display them on the screen. Also create two more Cgpa object, the first holds the cumulative result while the second accept the sum of the addition operation of the student’s cumulative result with that of the semester result. From the cumulative result object, print the data to screen and then the results of the addition operation.