UNIVERSITY OF LAGOS
FACULTY OF ENGINEERING
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
B.Sc.(Hon.) DEGREE EXAMINATIONS
EEG 311: COMPUTER PROGRAMMING LANGUAGES II
FIRST SEMESTER, 2010/2011 ACADEMIC SESSION

Instructions: 1. Answer any THREE questions
2. Build all your programs in a multifile organizational scheme
Time Allowed: 120 minutes

Question One

(a) (i) What is the function of the dot operator in a C++ programming? [2 marks]

(ii) List three differences between a data structure and an array. [5 marks]

(b) Write a structure tag and short main program that sets up a struct for a Super Eagles player that contains his name, earned run average (ERA), and team. In the program, declare one pitcher variable and pass its address to a function called Smokin'. This function fills the pitcher variable with the following information:

Name: Mikel Obi ERA: $ 10 million

Team: Chelsea

Once the data is in the structure, write the pitcher information to the screen. [18 marks]

Question Two

(a) (i) What C++ statement contains the default parameter values for a default parameter list function? [2 marks]

(ii) What steps are saved during program execution when an inline function is used? State one major drawback of using an inline function. [5 marks]

(b) Write a program that sets up an overloaded function set called GetRandomNum. These functions return a random number that is generated with stdlib.h's srand() and rand(). You will need to use the modulus function to do a little math to obtain the desired results. There are three different prototypes for the GetRandomNum function:

(i) Pass in a positive integer m and it returns an integer value between 0 and m-1.
int GetRandomNum(int m);

(ii) Pass in two integers (assume i and j are zero or positive and i < j) and receive a random integer between but not including i and j.
int GetRandom(int i, int j);

(iii) Void call returns a random number between 0.000 and 1.000. Assume that three digits of precision are necessary.
double GetRandom();

Your program should make three calls to GetRandom: once obtaining a number between 0 and 27, once obtaining a number between 3 and 73, and last obtaining a number between 0.0 and 1.0. Write all three numbers to the screen. [18 marks]

Question Three

(a) Explain the purpose of each of the following:

- Scoping operator
- Class constructor
- Class destructor

and hence, write their syntax. [7 marks]

(b) The volume, V, and surface area, A, of a sphere of radius r are given respectively, by the expression

$$V = \frac{4*\pi*r^3}{3}, \quad A = 4*\pi*r^2$$

Write a complete C++ program, with class Sphere containing private and public members, that asks the user to enter the radius of a sphere, calculates the volume and the area of the sphere, and prints the results (to two decimal places) as well as all associated dimensional information.

[18 marks]

Question Four

(a) (i) State the five characteristic features of an Object-Oriented Language. [5 marks]

(ii) Define the following:

- Polymorphism function [1 mark]
- Virtual function [1 mark]

(b) Write a C++ program that has a base class called Shape, and derived shapes (cone, sphere, pyramid and box.) Include the "WhatAmI" function for both base and derived shapes, and place the addresses of the four derived objects into an array of Shape pointers. Use the base pointer and a for loop to access all WhatAmI functions. [18 marks]