UNIVERSITY OF GHANA

BACHELOR OF SCIENCE IN ENGINEERING
FIRST SEMESTER EXAMINATIONS, 2012/2013
CPEN/CENG 201 : C++ PROGRAMMING (3 Credits)

Answer **All** Questions. Answer **Section A** in the answer **booklet** provided but **Section B** should be answered and saved in a **folder** with your **index number** on the **desktop**.
TIME : **3 Hours**

SECTION A - 30 MARKS

1. A C++ programmer has created a class called **student**. He is trying to use the normal system operators, $+$, $-$, $\times$, $\div$, etc to operate on objects of the class but he is having errors.
   (a) which C++ concept can rectify this error? [1 mark]
   (b) briefly explain the concept in 1a above with code snippets [4 marks]
2. Explain global scope and local scope. [3 marks]
3. What is the "this" pointer? [2 marks]
4. What is a preprocessor directive? Give **one (1)** example. [3 marks]
5. Distinguish between the **private** and **protected** access specifiers. [3 marks]
6. Explain the following principles
   (a) call by value [2 marks]
   (b) call by reference [2 marks]
7. Explain the effect of what happens when a programmer forgets to include the **break** statements in a **switch-case** block. [2 marks]
8. Briefly explain the concept of **friend functions** and also highlight **one (1)** application area. [3 marks]
9. Distinguish between a **class** and an **object** with examples. [2 marks]
10. Explain constructors and destructors as applied to C++. [3 marks]

 Examiner : **Steven Armoo**

SECTION B - 70 MARKS

1. Write a C++ program to print the system date and time. The date should have the form **"Monday, 26 November, 2012"** and the time should also display the hour, minute and second components. The time should be updated every **two (2)** seconds. [15 marks]

2. Students in a Trigonometry class have been given an assignment to investigate three trigonometric functions : sine, cosine and tangent.

   Create a C++ program to calculate the sine, cosine and tangent of all angles between 0° and 90° at intervals of 10°.

   The program should print the output to the file "**trig.txt**". The output should display the angle, the sine, cosine and the tangent. All values should be rounded to 4 decimal places. [20 marks]

3. A matrix is a 2-dimensional array. Create a C++ program using classes and operator overloading to perform the following tasks :

   (a) add two matrices [8 marks]

   (b) multiply two matrices [17 marks]

   (c) calculate the determinant of a matrix [10 marks]

   [Hint : Restrict yourself to 2×2 matrices]