THE OPEN UNIVERSITY OF SRI LANKA
B.Sc DEGREE PROGRAM: LEVEL 04
DEPARTMENT OF MATHEMATICS & COMPUTER SCIENCE
CLOSED BOOK TEST –2012/13 (CBT-1)
CPU2242: OBJECT ORIENTED PROGRAMMING USING C++ AND JAVA
DURATION: ONE AND HALF HOURS ($1\frac{1}{2}$ HOURS)

Date: 01st February, 2013 Time: 4.00pm – 5.30 pm

Answer ALL THREE questions.

Q1.

a) The following identifier declarations are written in C++ and some of these are syntactically incorrect and not accordance with the C++ programming style standard you have leant. Find these identifiers and precisely write down each error.

i. int _incomePerDay;
ii. int signed;
iii. double surprise!Variable;
iv. int 4seasons;
v. const int averageHeight;
vi. bool valid variable;
vii. int TotalCustomers_100;

b) Write the most suitable variable declaration (including their built-in data type) to represent the following items. Briefly explain the reason to select that particular built-in data type.

i. A constant to hold the Avogadro number
ii. A variable to hold the number of students in a class
iii. A variable to store the average temperature of a city during a month
iv. A variable to hold the name of a person
v. A list to store names of 40 students in a class room
vi. A variable to store the National identity card number (in Sri Lanka)
vii. To store marks of 40 students for 8 subjects

c) Write C++ assignment statements to evaluate the following equations.

i. Delta = b^2 - 4ac
ii. Area of a Circle = ($\pi \times d^2$) / 4;
iii. a = - A ⍰ cos θ
iv. $Z = \left(x - \frac{y}{5}\right)\left(\frac{x^2+y^2}{x-y}\right)^2$
v. $V_{rms} = \sqrt{\frac{3K_BT}{\mu}}$
vi. $P(X) = \frac{1}{\sqrt{2\pi\sigma^2}} e^{\left[\frac{-(x-\mu)^2}{2\sigma^2}\right]}$

Q2.

a) Determine the value of each of the following. Wrote your steps clearly.

i. 8 * 9 + 2
ii. 6.0 * 3 /4
iii. 5 + 1 && 10
iv. 5 > 10 || -6 > -3
v. pow (2,3) > 9 ? 2 : 3
vi. !(10 > 12) || 5 % 2 == 0

b) Answer the following briefly.

i. Why we use functions in a program?
ii. What are the advantages and disadvantages of passing a parameter to a function by value and by reference?

c) Construct function prototypes that match he following descriptions.

i. average() takes no argument but returns a float value
ii. calc() takes one integer argument and returns the square root of that integer variable
iii. increment() takes two integers and increment these values of the variables by one
iv. maxMarks() takes a set of maths marks of students and returns the highest student's mark
v. longestName() takes a set of names of students in a class and returns the longest student name
vi. count() takes a set of digits and alphabetical characters and returns the number of vowels in the list

d) What is the output of the following program?

```
#include<iostream>
using namespace std;

int main()
{
    int i, j, k;
    int n = 8;
    for (i = 1; i <= n; i++)
    {
        for (j = 1; j <= i; j++)
            cout<<'*';
        cout<<'\n';
    }

    for (i = n; i >= 1; i--)
    {
        for(j = 0; j < n - i; j++)
            cout<<' ';
        for (j = 1; j <= i; j++)
            cout<<'*';
        cout<<'\n';
  }

  cout<<'\n';

  return 0;
}
```

Q3.

a) State whether the following are true or false. If the answer is false, explain why.

i. An array can store many different types of values.
ii. An array index should normally be of data type float.
iii. If there are fewer initializers in an initializer list than the number of elements in the array, the remaining elements are initialized to the last value in the initializer list.
iv. It's an error if an initializer list has more initializers than there are elements in the array.
v. An individual array element that is passed to a function and modified in that function will contain the modified value when the called function completes execution.

b) Write one or more statements that perform the following tasks for an array called **fractions**.

i. Define a constant integer variable arraySize initialized to 10.
ii. Declare an array with arraySize elements of type double, and initialize the elements to 0.
iii. Name the fourth element of the array.
iv. Refer to array element 4.
v. Assign the value 1.667 to array element 9.
vi. Assign the value 3.333 to the seventh element of the array.
vii. Print array elements 6 and 9 with two digits of precision to the right of the decimal point, and show the output that is actually displayed on the screen.

viii. Print all the array elements using a 'for' statement. Define the integer variable 'i' as a control variable for the loop. Show the output.

c) Write a C++ program to convert an input value given in degrees Fahrenheit to the corresponding value in degrees Centigrade. Use appropriate functional breakdowns.

Hint :- $°C = (°F - 32) \times \frac{5}{9}$