EASTERN UNIVERSITY, SRI LANKA

DEPARTMENT OF MATHEMATICS

FIRST EXAMINATION IN SCIENCE (2010/2011)

FIRST SEMESTER (Nov/Dec, 2012)

CS 103 – INTRODUCTION TO PROGRAMME DESIGN & PROGRAMMING

ANSWER ALL QUESTIONS **TIME: TWO HOURS**

Q1)

a. State the following computer terms:
   i. Program;
   ii. Programming;
   iii. Programmer.

b. Describe the objectives in programming.

c. What are the differences between flowchart and Pseudocode?

d. Draw the flow chart for the following control structures:
   i. If – else;
   ii. For loop;
   iii. While loop;
   iv. Do – while.

e. If the ages of Ajay, Babu and Chandra are input by a user, draw a flowchart to determine the youngest of the three.

f. Write C++ programs to display the following patterns:

```
1
212
32123
4321234
543212345
```

(i)

```
A B C D E F G H
A B C D E F G
A B C D E F
A B C D E
A B C D
A B C
A B
A
```

(ii)

Q2)

a. List six types of C++ operators.

b. Consider the following code segment.

```
#include<iostream>
#include<conio>
int main
{
        clrscr();
        int n,t,r,p=0

        cout<<Enter the number;
        cin>>n.
        t=n;

        while(t > 0)
        {
                r = t%10;
                t = t/10
                p = p*10 + r;
        };

        cout<<"Output of "<<n<<" is "<<p
        getch();
        return 0;
```

i. This code segment has 10 syntactical errors. Write the above code segment without any errors.

ii. Write output for the following input values:

(Show the appropriate steps)

a) 82;

b) 103;

c) 1234.

iii. Modify the above code segment to calculate the digits sum of given input number.

Hint: digits sum of 143 is 8. (i.e. 1+4+3=8).

c. Write a C++ program that simulates a simple calculator using *switch* statements. It reads two integers and a character.
If the character is a '+', the sum is printed;
if it is a '-', the difference is printed;
if it is a '*', the product is printed;
if it is a '/', the quotient is printed;
and if it is a '%', the remainder is printed.

Q3)

a. Write the following function to reverse the first n elements of an array a:
void reverse(int a[],int n);
For example, the call *reverse(a,5)*
would transform the array {22,33,44,55,66,77,88,99} into {66,55,44,33,22,77,88,99}.

b. Write the following function such that it returns true if and only if the array obtained by reversing the first n elements is the same as the original array:
bool isSymmetric(int a[],int n);
For example, if a is {22, 33, 44, 55, 44, 33, 22} then the call
isSymmetric(a,7) would return **true**, but the call *isSymmetric(a,4)* would return **false**.

c. Write a C++ program to find the sum and average of an one dimensional integer array.

d. Write the following function to find the length of a string:
int length(char S[ ]).

e. Write the following function to count the number of words in a string:
void count(char S[ ]).

f. Write the function to concatenate the contents of string S2 to S1:
void concat(char S1[ ], char S2[ ]).

Q4)

a. What is meant by a *pointer* in C++?

b. Write a C++ program to swap two numbers using *pointers.*

c. Write the output of the following code segment:.

```
void pointerTest( )
{
int a=1, b=2, c=3, *p, *q;
p = &a;
q = &b;
c = *p;
p = q;
a = ++*q;
c = ++*p  +  *q;
cout<<"a= "<<a<<endl;
cout<<"b= "<<b<<endl;
cout<<"c= "<<c<<endl;
cout<<"*p= "<<*p<<endl;
cout<<"*q= "<<*q<<endl;
}
```

d. Briefly explain the term *structure* in C++.

e. Declare a structure for an employer's record consisting of the following fields: Name, Sex, Address, Basic salary, Allowance and Total salary.

Allowance will be calculated by 10% of Basic salary.

Total salary = Basic salary + Allowance.

Write a C++ program to keep records for 10 employers to do the following tasks:

i. Read the Name, Sex, Address and Basic salary;

ii. Calculate the Allowance and Total salary of each employer;

iii. Display the Name, Sex, Address, Basic salary, Allowance and Total salary of each employer.

****** End ******