

**NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY**  
**FACULTY OF APPLIED SCIENCE**  
**COMPUTER SCIENCE DEPARTMENT**  
**JANUARY EXAMINATIONS 2013**

**SUBJECT: STRUCTURED PROGRAMMING**  
**CODE: SCS2107**

**INSTRUCTION TO CANDIDATES**

This question paper consists of Six[6] questions  
Answer **Four** questions only  
Each question carries 25Marks  
ALL QUESTIONS TO BE ANSWERED IN C++

**Time: 3 hours**

**QUESTION ONE**

- (a) With the aid of diagrams briefly explain the structured programming constructs. [12]  
(b) Explain the meaning of a structured walk-through? [3]  
(c) Outline the advantages and disadvantages of structured walk-through. [10]

**QUESTION TWO**

- a(i) What is an "infinite loop," and how can it be useful? [5]  
a(ii) What is wrong with the loop in figure 1.0 [5]

```
while (n <= 100)
sum += n*n;
```

**Figure 1.0:loop**

- (b) Convert the for loop in figure 1.1 into a while loop:

```
for (int i=1; i <= n; i++)
cout << i*i << " ";
```

**Figure 1.1**

- [7]  
(c) Write and run a program that simulates a simple calculator. 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. Use a switch statement. [8]

### QUESTION THREE

(a) Write a function "print\_pyramid(...)" which takes a single integer argument "height" and displays a "pyramid" of this height made up of "\*" characters on the screen(see figure2.0). [14]

```
    **
   ****
  *~~~~*
 *~~~~~*
*~~~~~~*
*~~~~~~*
*~~~~~~*
*~~~~~~*
```

**Figure 2.0: Pyramid**

(b)Write a recursive function to find the Fibonacci series of a number. [11]

### QUESTION FOUR

a)Explain the following:

(i) the difference between an array and a simple variable [3]

(ii) double a[5]; [2]

(iii) float b[3][5]; [2]

(iv) int c[5][4][10]; [2]

(b)What is the number of the last element of the following array?

int test[5]; [2]

(c) write down the output of the code in figure 3: [5]

**Figure 3:Code**

```
include <iostream>
using namespace std;

int main()
{
    const int numberOfItems = 5;
    double distance[numberOfItems] = {44.14, 720.52,
    96.08, 468.78, 6.28};

    cout << "Members of the array\n";
    for(int i = 0; i < numberOfItems; ++i)
        cout << "Distance " << i + 1 << ": " <<
distance[i] << endl;

    return 0;
}
```

**(d)**Write a function named "reverse" that takes as its arguments the following:

- an array of floating point values;
- an integer that tells how many floating point values are in the array.

The function must reverse the order of the values in the array. Thus, for example, if the array that's passed to the function looks like this:

0	1	2	3	4
5.8	2.6	9.0	3.4	7.1

then when the function returns, the array will have been modified so that it looks like this:

0	1	2	3	4
7.1	3.4	9.0	2.6	5.8

The function should not return any value.

[9]

### QUESTION FIVE

**(a)** Explain the following:

- (i) Non public constructors
- (ii) Inline function
- (iii) Virtual functions
- (iv) Types of Inheritance.

[3 Each]

**(b)** Write a program to prepare the mark sheet of a NUST examination sheet with the following items from the keyboard:

- Student name
- Student number
- Course name
- Course code
- Continuous Assessment mark
- Exam mark

Design a base class of data members ,student name,student number.The derived class consist of the data members ,course name,course code ,continuous assessment and exam mark

[13]

### **QUESTION SIX**

Compare and contrast Structured programming and Object Oriented Programming (OOP) [25]

**END OF QUESTION PAPER**

